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State Procedures for Communicable Disease Control*

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DURING the meeting of the American Public Health Association in Kansas City in October, 1938, there was a session of the Committee on Evaluation of Administrative Practices at which comment was made upon what appeared to be unnecessarily long periods of isolation required for some of the communicable diseases in certain cities. The health officer of one city referred to explained that while he believed that his isolation regulations were inconsistent with the known periods of communicability of some of the diseases, he had no choice but to enforce them as they were so specified in the state sanitary code.

A request was made that the Committee on Evaluation study the current state procedures for Communicable Disease Control to learn the extent of their variance from or agreement with those proposed by the Committee on Control of Communicable Diseases, and officially adopted by the American Public Health Association and endorsed and published by the U. S. Public Health Service in three successive editions of 1916, 1926, and 1935. (*Reprint 1697*).

Your invitation to me to take part in your program is, I presume, to hear a report upon this study which has been made from the official documents courteously supplied from the offices of the various officers of state, insular, and territorial health services.

It must be admitted that there is no intrinsic merit in the uniformity of regulations, *per se*, nor is standardization of procedures for the sake of uniformity of practice alone always justified. However, when personal liberty is restricted in the interest of the prevention of communicable disease, under the authority of sanitary laws, ordinances, rules and regulations, it is a matter of official concern and may at any time become a matter of legal intervention, if it appears that the periods of isolation imposed upon infected persons, and periods of quarantine required of exposed susceptible persons are in-

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consistent with the known periods of incubation and communicability of the disease in question. Furthermore, the credit of a public service presumably conducted on the basis of exact knowledge of the natural history of disease is at stake, and may easily be brought into disrepute and the reasonable disregard of both the laity and the medical profession, when within neighboring health jurisdictions the same disease is subject to widely varying official restrictions.

Of the 44 communicable diseases of which notification to local or state health department is usually obligatory in the states and other political subdivisions of the United States, I have selected 12 as illustrative of the major factors involved in administrative control.

It can be easily seen that if for each disease and each of the 56 political units under study, every stage of control from notification to terminal disinfection, immunization of susceptibles and discovery of the source or sources of infection were analyzed, the presentation of any useful observations would require an encyclopedic monograph. Any such meticulous and detailed analysis appears to be quite unnecessary in view of the ample evidence of lack of uniform agreement between legal requirement and scientific fact offered in the restricted field of the present study.

I have therefore selected from among the 15 items tabulated for each disease and each state only a few, including the incubation period, period of communicability, isolation and quarantine periods, for our present discussion.

It is customary although by no means universal practice for a state department of health to present in printed form for guidance of its own professional staff and for the convenience and education of physicians, sanitarians, and nurses in official and voluntary health agencies, and for medical institutions and agencies and practitioners of medicine within the state, a statement of procedures and the phenomena of disease upon which these are based at least for the commoner notifiable diseases.

Among the essential facts to be included in any such official publication are the lengths of the incubation and communicable stages of the disease upon which the isolation and quarantine requirements are based, as well as a precise definition of the duration of and conditions of release from isolation and quarantine.

While much remains to be determined by further and more exact definition of these periods even in diseases with which we have long been familiar, there is sufficiently exact information, officially accepted by the American Public Health Association and the U. S. Public Health Service, and available at nominal cost from the Superintendent of Documents, so that there is no excuse, except a greater accuracy of knowledge on the part of the state health officer or board of health, for any serious discrepancies in the procedures recommended. Taking the requirements applicable to these 12 diseases as convenient examples I can express in relatively brief form the range of variance in the practices as provided for (I cannot say in all instances observed) in the several states. In using the term states I include for convenience, Washington, D. C., the Canal Zone, Hawaii, Alaska, Philippine Islands, Virgin Islands, and Puerto Rico.

1. CHICKEN POX

Chicken pox has a recognized incubation period of from 14 to 21 days and a period of communicability of not more than 6 days from the appearance of the first crop of vesicles and certainly not more than 10 days, regardless of the disappearance of primary or secondary scabs and healing of the

lesions on skin and mucous membranes.

Seven states do not require the reporting of chicken pox. Twenty-five states either fail to declare the incubation period or state it to be 14 to 21 days. A few states make a routine practice of verifying diagnosis in cases reported in persons over 15 years of age, and in 1 state for persons over 12.

Isolation is required by 17 states "until the scabs disappear."

Twenty-two states fix the period of isolation at anywhere from 6 to 21 days. Thirteen of these specify that in any event scabs must have disappeared prior to release. Only 2 states definitely commit themselves to an isolation period of 6 to 10 days from the appearance of the first vesicle.

While there is no known benefit to the patient, to susceptible contacts, or to the public at large, from quarantining susceptibles exposed to chicken pox, there are 7 states which require quarantine of adult contacts, and 15 which require quarantine of child contacts. Five other states leave quarantine to the discretion of the local health officer in the case of adult contacts and 4 in the case of children. In 1 state daily inspection of contacts for 21 days from last exposure to chicken pox is required.

In 16 states concurrent and terminal disinfection is called for, in 11 concurrent alone, and in 2 terminal alone.

2. DIPHTHERIA

Diphtheria has a recognized usual period of incubation of 2 to 5 days. The period of communicability, while determinable with considerable precision by culture methods, is usually less than 2 weeks, rarely over 4, and only in exceptional instances a convalescent carrier state continues for 2 to 6 months.

The questions we are mainly concerned with are: When should we begin with cultures for release from isolation? When should we release from isolation if culture control cannot be had? At what time after the onset of the disease should we apply the virulence test to determine whether a convalescent carrier need be further isolated?

In 29 states the incubation period is officially declared to be not more than 7 days (almost all specify 2 to 7 days); 19 states make no declaration on this point.

Thirty-eight states require for release from isolation 2 negative cultures from nose and throat with at least a 24 hour interval between. One state requires only one negative nose and throat culture. Among the states requiring 2 negative cultures for release, 24 specify the time at which the first culture may be taken, from 7 to 21 days after onset of the disease.

A virulence test is called for in the regulations of 22 states, the time when this is first to be applied varying from 2 weeks to 6 weeks after onset of the disease. In 4 states the time when the virulence test is to be made is not specified.

Quarantine procedures must be analyzed according to the status of the contacts, *i.e.*, adults or children, susceptible or not, for each of which classes of contacts there are various procedures in the several states.

Eleven states do not isolate adult contacts except food handlers or those in occupational relation to children. Twenty-six states release adults on one or two negative cultures. One state quarantines all adult contacts until the death or recovery of the patient. One requires food handlers to live elsewhere if they return to their work when they have had two negative cultures.

For immune children 8 states require quarantine, 4 require negative Schick test before release; 28 require negative cultures before release; 6 states leave all quarantine of adults and children to the discretion of the health officer.

For susceptible children 10 states re-

quire passive immunization or a Schick test; 17 release a child on a negative culture; 9 require absolute quarantine; 1 requires quarantine up to 7 days after release of the patient.

Two states require fumigation of upholstery and 1 requires destruction of all articles exposed to patients' discharges which cannot be sterilized.

3. DYSENTERY (AMEBIC)

In amebic dysentery, neither isolation of the patient, nor quarantine of contacts is recommended.

The basis of release from isolation which is commonly required varies as follows: 7 states release from isolation only on several negative stool findings at various intervals; 1 state requires 3 negatives at 24 hour intervals, and then monthly for 4 months, and thereafter once every 6 months; 1 holds the patient for 5 days and releases on repeated negative stool specimens: 1 releases on 2 negative specimens with a week's interval; 1 releases on 3 negative specimens with a week's interval; 3 on 2 negatives with a day's interval. In some instances these regulations apply only to sick food handlers, in others to all patients.

4. DYSENTERY (BACILLARY)

The recommended procedure is isolation during the period of communicability, which is believed to be while the fever lasts and the infecting organism continues to appear in the bowel discharges. This may be as long as 4 weeks, and may continue into a carrier state. Rigid precautions by attendants are advised and quarantine of contacts is not recommended. An incubation period of 2 to 7 days is recognized.

Fourteen states declare the incubation period to be 2 to 7 days, the others make no mention of this in their regulations.

Isolation is required by 2 states for 10 days after the patient's temperature is normal; 7 states release after repeated negative stools following normal temperature; 2 release after 3 to 4 weeks. Eight states release on negative stool findings specified as to number and intervals, *viz.*, 3 require 3 negative stools with one day intervals; 3 require 2 negatives with one day interval; one requires 4 negatives at 5 day intervals; one requires 2 negatives after a 4 week isolation period.

No state requires quarantine of contacts.

5. RUBELLA—GERMAN MEASLES

The recognized incubation period is 14 to 21 days, usually 16. The period of communicability is from the onset of catarrhal symptoms for at least 4 days but not more than 7 days. Isolation of patients is rarely practicable but it is recommended for the presumed period of communicability. Quarantine of contacts is not recommended.

Reporting is required by all but 5 of the states. The incubation period is declared by 24 states, all but 2 adopting the period 14 to 21 days, while 1 uses a 14 day period, and 1 a 10 to 21 day period. Twenty-eight states make no mention of the incubation period in the regulations.

Isolation for the recommended period of 4 to 7 days is required by 28 states, with 4 states requiring 8 days, and 1, 4 days from appearance of the rash. Of the other states 16 mention no isolation period, and 3 leave it to the discretion of the attending physician or health officer; 1 holds the patient for 5 days after the disappearance of the rash; 1 holds for 10 days from onset; 1, 16 days; and 1, 21 days.

Quarantine of susceptible children is required by 9 states; in 5 states for 14 days after exposure; in 1 for a period from the 10th to 22nd day after exposure; in 2 for 21 days from exposure and in one for 14 days after a 10 day interval since exposure.

6. MENINGOCOCCUS MENINGITIS

The incubation period is recognized as being 2 to 10 days, commonly 7, and the period of communicability during the clinical course and until the infecting organism is not found in nose and mouth secretions, usually 2 weeks. Quarantine of contacts is not recommended.

All but 4 states require notification of the disease. Twenty-eight states do not mention the incubation period. Twenty-one states declare it to be 2 to 10 days, while 1 state gives it as 16.

Isolation of the patient is terminated on the basis of negative cultures, usually specified to be taken after an interval of days after the onset of the disease by 14 states, and without culture by 17 states. Release is at the discretion of the health officer in 4, and is not specified by 9 states. Three negative cultures are required by 4 states, with 5 day intervals or less the first taken 2 to 3 weeks after onset. One state requires isolation to last until recovery, death, or transfer of the patient.

Quarantine of contacts is not required by 8 states, and its duration is not specified by 6 states. It is required that all contacts be held at the discretion of the health officer in 9 states. Contacts are released after 14 days (in two instances after 10 days) on negative cultures. Contacts who remain at home are released in 1 state 1 week after the patient is isolated, and in 13 states are held for a 2 week incubation period, and in 2 states for a 10 day period.

7. TYPHOID FEVER

The accepted period of incubation is 7 to 38 days, usually 7 to 14. The period of communicability is from the appearance of prodromal symptoms until the discharges are free from the infecting organism.

The incubation period is not specified in 16 states. It is declared to be 7 to 14 days by 3 states; 7 to 24 days by 1 state; 1 to 21 days by 1 state; 7 to 21 days by 2 states; 7 to 23 days by 11 states; 14 to 21 days by 1 state; 7 to 16 days by 1 state; 14 days by 1 state; up to 30 days by 1 state.

Release from isolation is neither required nor referred to by 7 states. Release on the basis of negative cultures of feces and urine is required by 34 states of which 14 do not specify the number or interval between specimens, nor the time when the first specimen is to be taken. The practice recommended, *i.e.*, release after 2 negative cultures from urine and stools taken 24 hours apart, is specified by 5 states. Release is permitted after 3 negative cultures at 24 hour intervals by 2 states; 2 specimens 1 week apart by 1 state; 2 specimens 5 days apart in 1 state; 2 specimens 7 days apart in 4 states; 3 specimens at 1 week intervals in 1 state; 2 negative specimens 3 weeks apart, the first taken 10 days after clinical recovery in 1 state, 3 negative specimens at 4 day intervals in 1 state. The time for taking the first specimens varies from 6 to 10 days after the patient's temperature returns to normal or there is clinical recovery.

In 1 state release follows 7 days of normal temperature without release cultures.

8. MEASLES

The accepted facts about measles are that the incubation period is 8 to 10 days from exposure until the onset of fever, or 12 to 14 days from exposure to appearance of the rash, rarely as long as 18 days.

The period of communicability begins with the catarrhal symptoms and lasts until abnormal secretions of mucous membranes cease; from 4 days before to 5 days after appearance of rash.

Isolation is recommended during the period of communicability.

Exclusion of exposed susceptible children and teachers from school for 14 days from last exposure may be justifiable. With date of a single exposure known, an exposed susceptible school child may attend school for the first 7 days of the incubation period.

In 10 states the regulations are consistent with the above facts in all essentials. The incubation period is not specified in 19 states; is given as 7 to 14 days in 1 state; 7 to 18 days in 3; 6 to 18 days in 1; 8 to 21 days in 2; 10 to 14 days in 1; 1 to 14 days in 1; 14 days in 5 states.

The isolation period is consistent with the facts in 13 states; is required for 14 days after notification in 1 state; 10 days in 3; 7 days in 6; 5 days after disappearance of symptoms in 5; 7 days after disappearance of symptoms in 7; 8 days after disappearance of symptoms in 1; there is no specification in 3; and the duration of isolation is at the discretion of the health officer in 4.

Quarantine: for adults there are no restrictions in 9 states; 14 days of quarantine are required in 13 states of which 6 specify school teachers; the quarantine periods are at the discretion of the health officer in 7 states.

For children there are no restrictions in 2 states; quarantine is required for 14 days from exposure in 22 states; for 7 to 17 days in 2 states; at the discretion of the health officer in 4 states.

9. MUMPS

The accepted incubation period for mumps is 12 to 26 days, most common 18 days, and 21 days not uncommon. Communicability is assumed to be from onset until the parotid gland has returned to its normal size.

Twelve states have procedures essentially consistent with the accepted facts.

Six states do not require reporting; 39 do.

The incubation period is declared to be 12 days in 1 state; 14 days in 1; 4 to 30 days in 4 states; not less than 21 days in 1; is not specified in 18.

Isolation: In 22 states children are isolated and excluded from school while in the communicable stage, although none of these states defines the period. In 4 states isolation is required for 2 to 7 days; in 1 state for 10 days; in 1 state 3 weeks from onset; in 1 until recovery; in 2 states 2 weeks from onset and 1 week after swelling of parotid has disappeared.

Quarantine: Most states do not require quarantine of exposed susceptibles. In 4 states quarantine is at the discretion of the health officer; in 7 states it applies to susceptible children for 21 days, with or without daily inspection of the child.

10. SCARLET FEVER

The accepted facts regarding scarlet fever are, that the incubation period is 2 to 7 days, usually 3 to 4, and a period of communicability usually 3 weeks from the onset and until abnormal discharges have ceased and open sores or wounds have healed, regardless of stage or extent of the desquamation.

Fourteen states accept the facts as to length of the incubation period; 2 states specify 2 to 10 days; 1, 10 days; 4 specify 3 to 4 days; 1, 14 days; 12 do not specify duration.

The isolation period required in 25 states is 21 days; in 8 states it is 28 days; in 1 state 14 days; in 1 state 30 days; in 1 state until complete recovery; in 3 states at the discretion of the health officer; in 12 states it is not specified.

Quarantine is as recommended in 29 states, *i.e.*, exclusion of exposed school teachers and children from school, and food handlers from their occupation, for 7 days from last exposure (6 release earlier on negative Dick test); 8 quarantine at the discretion of the

health officer; 4 do not quarantine adults if the patient is isolated; 4 maintain quarantine of members of the household for the duration of the patient's illness.

11. POLIOMYELITIS

An incubation period of 7 to 14 days is accepted as common. The period of communicability is not definitely known, but is believed to include the latter part of the incubation period and extend after onset of the disease for a week or two and possibly much longer. Tracing of a case to a previous case is rare.

In one state the disease is not reportable.

An incubation period of 7 to 14 days is so defined by 10 states; is specified to be 6 to 21 days by 1 state; 3 to 10 or 14 days by 5 states; 2 to 3 days by 2 states; 10 days by 1; 14 days by 1; and is not mentioned by 17 states.

Isolation is required for 2 weeks from onset by 15 states; 3 weeks by 18 states; at the discretion of the health officer by 3 states; no duration is specified by 4 states.

Quarantine of adults and immune or susceptible children is required as recommended by 17 states; quarantine of adult wage earners is not required if the patient is isolated, by 4 states; is required of exposed adults in contact with children or food handlers for 21 days in 4 states; release from quarantine is permitted after disinfection and removal to other residence by 1 state.

For immune children quarantine is not required if they are removed from the household and public places in 3 states; is required for 10 days in 1 state; for 21 days in 5 states; at the discretion of the health officer in 5 states.

For susceptible children: quarantine is not required if they are removed to a household where there are no other children in 2 states; for 10 days in 1 state; for 21 days in 5 states; at the discretion of the health officer in 6 states.

Two states require gaseous disinfection at termination of the case.

12. PERTUSSIS

The accepted incubation period is commonly 7 days, almost uniformly within 10 days, and not exceeding 16 days; the period of communicability is believed to be from the beginning of the catarrhal stage for 7 to 14 days until 3 weeks after the development of the characteristic whoop.

The incubation period as stated above is accepted by 15 states; is specified to be 10 days by 1 state; 14 days by 2 states; 16 days by 1 state; 14 to 21 days by 2 states; 4 to 14 by 4 states; and is not specified by 11 states.

All states require isolation of the patient; 6 for the period of communicability; 1 for 1 week after onset of the whoop; 2 for 2 weeks from the whoop; 6 states for 3 weeks; 6 states at discretion of the health officer; and 3 for an unspecified duration.

Quarantine of exposed susceptible children is required as recommended for 10 days after last exposure by 11 states; for 14 days by 1 state; for 16 days by 1 state; at the discretion of the health officer by 8 states; during the illness of the patient by 3 states; only for children in institutions in 1 state; for an unspecified duration by 4 states.

One state requires terminal fumigation.

COMMENT

The inconsistencies between reasonably exact experience or observation of incubation and communicable periods of these notifiable diseases and much of the regulation of isolation and quarantine as implied or specified in the publications of state health authorities,

and in the main obligatory upon the respective subordinate health jurisdictions of the states, appear to me to be so considerable in number and degree as to justify your attention.

In spite of these evidences of somewhat irresponsible exercise of the powers of state health authorities in this, the oldest field of preventive medicine, a field full of triumphs and general progress, the present status of communicable disease control is encouraging. Still greater success, with less annoyance to the patient, his family, and the public can probably be achieved if administrative requirements and practice are brought more nearly into agreement with our knowledge of the natural history of these diseases.

Among the multitude of obligations, which should be met by state health authorities in the traditional fields of their authorized functions, namely, to do their own work with approximate scientific accuracy, before they attempt the difficult and intricate functions of organized care of general medical and surgical illnesses, are those which involve the control of communicable diseases.

It seems to me that the best way to earn merit and the confidence and support of the public for essential health functions is to do the duties now required by law so well that no reasonable criticism from the public or the medical profession can be brought against you.

Rather than to encourage the exercise of persuasion and publicity and politics to have new functions and extensive new funds and duties added to you, for which in the main you lack essential experience and professional qualifications, I urge you to serve in the best possible way with your present resources those functions which no one else can carry on under the law, or is so well prepared for as you are.

The Selenium Problem and Its Relationship to Public Health*

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IN the preparation of this review reference has been made to 78 published studies on the selenium problem and its various aspects. These articles embrace only those written in the last 5 years. It is the desire of the writer to call special attention to the splendid contributions to this subject by Stenn, Moxon, Dudley, Franke, and Byers and his associates.

The earliest description of what was probably selenium poisoning is found in Marco Polo's accounts of his travels in the 13th century. In this country the Sioux Indians told the white man of a legend based on its effects. Probably the first recorded account of toxic forage was made in 1856 by Dr. T. C. Madison, an army surgeon stationed at Fort Randall, Territory of Nebraska, now more specifically located on the Missouri River in South Dakota. Since then Mayo, Peters, and Lipp, and others have further implicated Wyoming, Nebraska, and South Dakota. These early observations showed that horses, cattle, pigs, chickens, and mules were the principal animals affected. No mention is made of any human involvement. In 1937, Byers described an interesting situation that he found in Mexico. In a certain valley of that country there has existed for more than two hundred years an obscure disease known as "soliman" whose symptoms bore an exact resemblance to those of "alkali disease."

Although these isolated observations were a matter of record, and stock poisoning continued to be a malady reaching serious proportions, very little if any light was thrown upon the problem until 1934. In this year, Franke reported experiments indicating that the cause of the trouble was resident in the ration. He showed that grain grown in areas where it was known that animals became toxic caused definite symptoms of poisoning when fed to rats. From this time on the solution to the mystery unraveled itself rapidly. Robinson discovered selenium to be present in the toxic grain. Byers showed the wide, though spotty presence of selenium in shale soils. Hurd-Karrer demonstrated the fact that plants could take up selenium from the soil. Finally, Franke proved the implication of selenium by demonstrating that selenium salts when fed to rats produce the same results as when toxic grains were added to the ration. It is true that Byers showed chromium, vanadium, arsenic, molybdinum and tellurium to be present in the soils along with selenium and

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that some of these metals were also found in plants. Nevertheless, the work of Franke and others points conclusively to selenium as the toxic factor producing the symptoms of the condition known commonly as "alkali disease" or "blind staggers."

What is now known as selenium poisoning was called "alkali poisoning" in the earlier days. This appellation is now known to be a misonmer for the disease is neither directly nor indirectly caused by alkali water or by alkali spots in the soil. There are two forms of selenium poisoning among livestock. One is an acute form "blind staggers" which is the predominant type in South Dakota, and the other is a semi-acute or chronic form "alkali disease" which is the predominant type in Wyoming.

There is a very definite similarity between selenium, sulphur, and tellurium. They have chemical and physical properties in common. Nutritionally, selenium is regarded as of no importance, but the similarity of selenium and sulphur and the value of the latter in the oxidation-reduction mechanism make it seem possible that in sub-lethal doses, selenium might play a nutritive rôle. Selenium was the only one of the elements used that caused liver pathology in rats. In toxic cereals it is present for the most part, if not exclusively, in organic combination and is probably not in a high state of oxidation. It is bound in the protein molecule in such a manner that it will go into solution only after the protein has been hydrolyzed. Available evidence favors the belief that selenium may be able to displace sulphur in the cystine and methionine molecules. Jones has shown that selenium is associated with cystine and the selenium analog of cystine has been prepared by a couple of workers. For nearly every organic sulphur compound, a selenium homologue has been prepared. These selenium compounds resemble those of sulphur in both their preparation and their reaction.

The amount of selenium in wheat is not proportional to the amount in the soil which may indicate that there is a difference in the forms in which it occurs, and in their availability. The toxicological features of organic selenium compounds may be entirely different from those of the inorganic compounds. In the body, selenium undergoes some type of change for it occurs as an organic protein-like complex in the red corpuscles and as an ether soluble volatile fraction in the urine.

Plants differ greatly in their ability to take up selenium from the soil, and consequently it is present in plants in concentrations which range from traces up to quantities that are lethal to animals. It is the only mineral known to be absorbed from the soil by food plants in sufficient quantities to render them lethal to animals. It may be absorbed in larger quantities in dry than in wet seasons.

There are certain native plants that always contain selenium when they are grown on seleniferous soils. In fact, it appears that some plants called "indicator plants" are incapable of growing on a soil unless it contains this element which may indicate that it is essential for their growth. In one variety of plant, at least, it was shown that the growth rate could be accelerated by the addition of selenium to the soil. These plants are capable of taking selenium out of soil to a much better degree than other plants, and by their death and disintegration steadily enrich the soil in an available form of this element. Other forms of vegetation will therefore show a marked variation in selenium content depending upon the proximity to or absence of these plants. For this reason "indicator plants" are also called "converter plants."

The absorptive power of plant life for selenium depends upon the degree of rainfall, leaching, weathering, the composition of the soil, the geological outcrop upon which the plant material grows, the species of plant, the presence of converter plants, available sulphur, the stage of growth of the plant, and the part of the plant examined. So far as is known at present, no crops grown on a large scale have any special absorptive power for selenium, but all the plants so far investigated absorb some.

Toxicity of cereal grains may vary with the season, with the maturity, and with the length of the storage period. It is thought that the toxicity of selenium depends largely on the ionic combination in which it occurs. All experimental evidence is against the assumption that a tolerance for selenium can be acquired. It favors rather the belief that selenium shows cumulative effects. While the lethal dose of selenium in vegetation is approximately 2 milligrams per animal pound, no minimal concentration at which selenium may be harmful has yet been found. Amounts of selenium less than lethal, have a definite inhibitory effect on the growth of young animals.

Selenium is widespread in the earth's crust, occurring in small quantities (0.005 per cent) in the combined and in the free state. All soils of pyritiferous origin and not exposed to the leaching effect of rainfall, should show the presence of selenium. Primarily, selenium is volcanic in origin. It has been found associated with sulphur in the volcanic emanations. Rain washes the selenium from the air and deposits it in the soil. There the percolating waters gradually leach out the selenium and carry it down to the sea where shales of the upper cretaceous period were formed. The distribution of dust and gaseous material of volcanic origin is world-wide. In the North Central Plains, selenium was deposited contemporaneously with periods of high volcanic activity of the Rocky Mountains. It may therefore be said that no soils and especially no ferriginous soils exist in which selenium cannot be found. Soils of arid and semi-arid regions that have in the past been exposed to volcanic action and which have not been exposed to the leaching effect of water may be expected to contain selenium. Many of the toxic districts existing in the Rocky Mountain area have been brought about by vegetable enrichment of selenium through countless cycles of growth and decay of the indicator or converter plants already described.

Selenium has been found not only in the soil and in the crops, but also in the water of temporary springs and in the drainage from irrigated lands. Usually, however, the water supplies of seleniferous areas are either free or so low in selenium as to preclude any possibility that they might be responsible for serious injury unless this water be used for irrigation purposes.

The distribution of seleniferous areas is so widespread (12 states are definitely known to possess such areas and 2 others are suspected), and the economic and public health aspects of the situation so critical that much effort has been and is being spent in determining the best manner to meet the difficulties presented. Some effort has been made to mitigate the toxic effect of grain by storing it for several years before using it. Hurd-Karrer showed that the addition of sulphur to selenium-containing soils reduced the absorption and assimilation of selenium by plants. This has not been borne out in practical trials. Even if it were proved correct, economic considerations would bar its use because the cost of the sulphur would exceed the cost of the land.

The same would be true probably for the use of iron. It has been shown that basic iron reacts with selenite to

produce an insoluble compound. Highly ferriginous soils convert absorbed selenium to a highly insoluble form—a basic ferric selenide.

Moxon has recently made some most interesting observations. When arsenic is fed along with seleniferous grains to rats, the characteristic symptoms of poisoning do not occur. As little as 5 p.p.m. of arsenic in drinking water protects the liver from injury. The animals also remain free from the other symptoms characteristic of this intoxication. Compounds other than arsenic that are non-toxic in themselves have also given promising results.

Physiologically selenium salts may be reduced in the body to the metallic state, as for example by glucose. If this occurs in the intestinal tract, the insoluble material may then be eliminated with the feces. The absorbed selenium undergoes changes whereby some is excreted by the lungs in a volatile form—methyl selenide—and another portion in the urine as an ether soluble volatile compound. It has been noted that animals are capable of detecting minute traces of selenium in forage plants or rations and will avoid them whenever possible. As the result of such observations, it has been suggested that seleniferous areas be allowed to revert to prairie and be used only for grazing purposes.

The federal government is aiding in the solution of the problem by cutting out of agricultural use large areas of seleniferous land. Already about 100,000 acres have been removed from use by outright purchase under the marginal land purchase program.

The participation of the government in the solution of the selenium problem is evidence of its seriousness. Because of the tremendous economic aspects of the problem, the toxicological phases of the research were directed exclusively to the study of animal involvement. Not until the last two years has there been a great enough realization of the economic and sociologic phases of human involvement to divert some of this research into this aspect of the problem. Since 1936, Dudley has published a few reports on selenium as an industrial hazard, and Smith and his associates have published two reports of surveys made of the inhabitants of involved areas. In contrast to these meager reports are dozens of publications dealing with selenium poisoning in stock, farm animals, and poultry.

In many respects the very nature of the problem is such that animal experimentation must precede studies of human involvement. Experiments on the toxic effect of selenium have been carried out with rabbits, rats, cats, dogs, hogs, calves, fish, and sheep. The pathology and symptoms of selenium poisoning to be described will be, therefore, largely those determined by animal experimentation. The results will be presented concisely and as far as possible correlated with the findings obtained from human studies.

It must be recalled that selenium occurs in vegetation in variable quantities. It is therefore possible that animals feeding over various areas or animals fed rations obtained from different districts may manifest degrees of selenium poisoning ranging from mild to very severe. With a highly toxic ration a sound animal will in a few hours or several days at the most, refuse to eat, become blind, drool profusely, and begin to wander about aimlessly. With a less toxic ration there will be noted a decreased rate of growth, a restricted food intake, an impairment in the general appearance, marked anemia, and, upon necropsy, gross evidences of abnormality.

Little is known of the relative susceptibility of farm animals to the poisonous effect of selenium. It is stated that the untrained individual does not easily recognize selenium

poisoning until the case is well developed. By that time the tissues have been permanently injured. The symptoms and pathology of selenium poisoning have been described under two heads: acute and chronic.

Animals suffering an acute poisoning have a marked pulmonary congestion or edema, hemorrhage and edema, general muscular weakness, labored respiration, and asphyxial convulsions. Animals dying early show little pathological change except for varying degrees of congestion, hemorrhage, and edema of the lungs. The large collections of fluid in the pleural and peritoneal cavities cause an anhydremia which in turn explains the high hemoglobin values found in cases of acute poisoning.

In human beings selenium is partly eliminated by the breath in the form of methyl selenide, a volatile compound which gives rise to the odor of garlic. This method of excretion as well as inhalation possibly accounts for the painful and prolonged bronchitis and pharyngitis found in humans exposed to selenium in the air. There is also an excessive secretion accompanying these disturbances.

Catfish living in water to which selenium has been added become very anemic. On severely toxic diets, rats also develop a progressive anemia frequently showing, in the severe cases, red cell counts as low as 450,000. The hemoglobin usually shows lower values than the red cell count. Often there is a marked reticulocytosis, reaching as high as 8 per cent. The anemia, when well developed, is essentially hypocytic and hypochromic. Anemia, however, has not been described as a symptom of selenium poisoning in humans.

When inorganic selenium or seleniferous grain is added to a ration, food consumption decreases as the quantity of poison increases. Rats voluntarily reduced their food intake to as little as 25 per cent of the normal. There followed a corresponding decrease in the rate of growth in the young or a loss of weight in the older animals. Many animals literally starved themselves to death rather than eat the food. The rats would assume a hunched position, their fur would become rough and stained a brilliant yellow around the genitals due to the excessive amount of bile pigment in the urine. Young rats are more susceptible than old ones. Animals on toxic diets do not reproduce well. If both mates were fed toxic food, the matings were infertile. If one animal was fed toxic food and the other a normal diet, occasional fertility resulted. Affected females could not raise young. Rats receiving as much as 17.5 p.p.m. of selenium in their food had no change in the basal metabolic rate.

Chicks hatched from eggs into which selenium salts have been injected were greatly deformed. Similar deformities occurred in eggs laid by hens fed toxic grain. Hens fed diets varying in the amount of selenium showed an equal variability in selenium in their tissues. When chickens were raised on a ration containing 65 per cent toxic grain, there was noted an inhibition in the rate of growth and a decrease and delay in egg production. Egg weights were less. After 6 days of feeding deformed embryos occurred. A continuation of the feeding for 6 more days resulted in complete loss of hatchability.

In acute poisoning in the hog, calf, and sheep, selenium was found in the blood, bile, and urine. The liver, kidneys and spleen contained the largest amount while less was found in the heart, brain, muscles, and lungs.

Acute effects of the ingestion of soluble selenium compounds may be summarized as consisting primarily of early cellular destruction of the liver with later pathological changes throughout the organism. The ingestion of small amounts of selenium compounds

over a long period results in retrograde changes in the liver and kidneys accompanied by a general debility.

After chronic selenium poisoning in rats, the liver, spleen, kidney, and pancreas contained the greatest concentration. In both rats and rabbits, the continued administration of selenium produced cumulative effects. Much of the selenium appeared susceptible to detoxication. Excretion of selenium is rapid at first, but traces remain for a long time. Animals dying after a prolonged exposure to selenium showed not only pathological liver changes, but serous effusions as well. It was noted that pathological changes occurring as a result of as little as 10 days' feeding were never repaired. Rats' stomachs showed a diffuse atrophy of the mucosa with areas of necrosis and ulceration. The liver changes were those of a periportal cirrhosis. The heart muscle and renal tubules were degenerated.

In a study of chronic selenium poisoning in the hog and horse, a distribution of selenium in the tissues similar to that in acute poisoning was observed. High concentrations of selenium were found in the hoofs. It is believed that selenium replaces sulphur in certain amino acids which are utilized in hoof formation. It was observed that cattle poisoned on the range improved when removed to better forage but never recovered from the injury done the liver and kidneys.

Hemorrhages occurred in the subcutaneous tissue and the muscle fascia near the joints. In the joints themselves—especially those involving the long bones—there was marked erosion of the articular surfaces. In horses, cattle, and swine there was a loss of hair from the mane, tail, switch, and body.

How near may the pathological changes and the symptoms of selenium poisoning as observed in animals parallel those occurring in man? It is stated that normal urine does not contain selenium and that if urinary selenium is found, it indicates exposure and absorption. In one of the surveys to which reference has already been made, 111 families living in a seleniferous area were examined. Ninety-two per cent of them showed the presence of selenium in the urine. The quantity ranged from 2 to 133 micrograms per 100 cc. Forty-seven and two-tenths per cent of these urines contained over 20 mg. per cent of selenium. The urine from horses showing definite evidences of selenium poisoning contained from 33 to 170 mg. per cent. Many of these individuals showed symptoms of chronic selenium poisoning. In humans as in animals it was found that the younger the individual the greater the effect of selenium.

In selenium poisoning of industrial origin, the symptoms were pallor, gastrointestinal disturbances, a garlicky odor of the breath and perspiration, irritation of the nose and throat, a coated tongue, a metallic taste in the mouth, and nervousness. In the surveys of human beings living in seleniferous regions, there were described vague symptoms of anorexia, indigestion, a general pallor, and malnutrition. From the amount of selenium in the urines of these individuals, it is probable that they were absorbing this element in quantities ranging from 0.01 to 0.2 mg. per kg. per day. All of these individuals had lived on seleniferous farms over 3 years, and most of them from 10 to 40 years.

A more detailed recital of the disorders found among people studied in these surveys includes (a) gastrointestinal disorders, (b) icteroid discoloration of the skin with a history of recurrent jaundice, (c) a sallow, pallid color, (d) rheumatoid and deforming types of arthritis, (e) cardio-renal disease and edema, and (f) changes of the skin

including dermatitis, pigmentation, diseased nails, and bad teeth.

So far human selenium poisoning has not been reported in the toxic areas but because of its occurrence among animals, definite absorption by humans of quantities known to be toxic to animals and the fair degree of resemblance in the symptoms between humans and animals, there is no reason to believe that it does not occur.

Workers in this field have been very cautious in their utterances. One has stated that although there was no definite correlation of symptoms and their incidence with the urinary selenium concentration, the assumption that selenium is harmless is not warranted. He feels that some of the signs of ill health are the direct result of a more or less continuous ingestion of small amounts of selenium over a long period of time. He adds further that symptoms existing in people with low selenium values can be explained as being due to chronic irreparable damage caused at some time in the past.

Intimately connected with the general problem of selenium poisoning as a health hazard to man are the following: (1) the precise sources of selenium to which man is exposed; (2) chemical nature of selenium; (3) the probable amounts absorbed by man in the places where exposure is known to occur; (4) the limits of tolerance, that is, how much may be absorbed with impunity. The selenium to which man is exposed —at least from food sources—is probably for the most part organic in nature. It does not seem probable that as little as 5 mg. of selenium daily could be absorbed more or less continually with impunity.

Man is exposed to the absorption of selenium from two sources—occupational and nutritional. Industries where selenium is a hazard can be divided into primary and secondary classes. The primary group includes industries which extract, mine, treat, or process naturally occurring minerals which contain selenium in appreciable quantities. The secondary group includes those industries which use selenium or selenium compounds as basic materials for manufacturing processes. The production of dusts, fumes, vapors, or liquors presents opportunities for the introduction of selenium into the body by absorption through the skin, inhalation, and ingestion. That these are definite industrial hazards is attested by the fact that selenium has been found in the urine of workers so exposed.

Mention should also be made of the use of Selocide—a selenium compound used as an insecticide for the control of the Pacific mite and the citrus red spider. Soils catching the run-off spray were also found to contain selenium.

Byers has set the tolerance limit of selenium in foods at 4 p.p.m. It is stated that the form of selenium occurring in cereals is more toxic than the inorganic form. Nearly all the selenium in wheat is concentrated in the gluten fraction. Two samples of gluten contained 0.8 and 15 p.p.m. Since the gluten of wheat carries most of the selenium, the examination of gluten proposed for special diets becomes of extreme importance.

Wheat, corn, barley, and emmer from seleniferous areas have been found to contain selenium. The degree of toxicity is in the order named. Hens fed a toxic grain in their ration, laid eggs that contained selenium. This was equally divided between the white and the yolk. Their own flesh contained selenium in rather high proportions. The selenium content of the eggs and flesh increased as this element increased in the ration.

In several areas in the United States, it has been shown that irrigation tends to diminish the effect of selenium on plants but this was not so when the

irrigation water contained selenium. Irrigation cannot be considered a remedial measure if the water contains selenium. This fact is well illustrated by the findings of Byers in his study of conditions in a certain valley in Mexico. The river water used for irrigation purposes was found to contain selenium. As a result, all vegetables, milk and meat raised in that valley contained selenium. Of special interest in this connection is the finding that Colorado River water at Topock, Ariz., after it has drained seleniferous areas contains 3 parts per billion of selenium. At Yuma it had increased to 4 parts. Similar findings should be expected in other rivers draining seleniferous areas. Now that the water from the Colorado River is to be used for irrigation purposes, the selenium that was carried into the Gulf of Mexico will be deposited in the soils irrigated and thus actually build up new seleniferous areas.

Smith and his coworkers found that foods raised in seleniferous areas gave high selenium values as Table I shows. The values are given in micrograms per 100 cc., or grams of material.

TABLE I

	Micrograms per 100 cc.
Beets	0– 118
Beans	38– 204
Bread	25– 100
Barley	165– 575
Cucumbers	0– 55
Carrots	43– 130
Corn	100–1,490
Cabbage	23– 452
Eggs	25– 914
Meats	117– 800
Milk	16– 127
Onions	36–1,780
Oats	200–1,000
Potatoes	24– 94
Peas	38– 204
Rye	87– 380
Rutabagas	172– 600
Tomatoes	0– 122
Wheat	115–1,880
Water	0– 33

Lettuce and turnip greens have been reported to contain selenium in amounts ranging from 0.3 to 150 p.p.m. Of the food listed, cereals are of special importance because of the quantities raised and their wide distribution to the markets of the world. Next in importance are the food concentrates such as egg powder, milk powder, cheese, gluten, and the flesh of chickens, cattle, hogs, and other flesh-producing animals. Fruits become involved because of the use of sprays. Vegetables and fruits both may become involved in newly developed irrigation districts. In this country milk from "alkalied" cows contained enough selenium to produce in their nursing young all of the prominent symptoms of selenium poisoning. Suckling pigs also became "alkalied" and lost their hair because of the transmission of selenium through the milk. The placenta is capable of transmitting selenium to the fetus so that the young are born with selenium in their tissues. This increases during the nursing period.

The future of seleniferous lands is a problem. The ability of animals to detect toxic vegetation would seem to indicate that one solution at least would be to let affected areas revert to natural prairie land to be used only for open grazing.

The human aspect of selenium poisoning is less well known. Only two efforts have been made thus far in determining to what extent humans may be involved. The awakening consciousness that the human being as well as the farm animal has an economic value; that human problems as well as agricultural ones demand concerted action, is making it highly desirable, if not imperative, that research laboratories and public health agencies make every effort to bring about a clearer understanding of the questions involved.

Only a few cases of injury to man have been definitely determined. The only studies made on humans have shown the presence in the urine of

selenium in quantities equal to that found in the urine of toxic animals. To deny the existence of selenium poisoning as such in these individuals because studies have not shown a symptom pathognomonic of selenium poisoning is assuming a very conservative attitude. Byers, in his Mexican studies, was not willing to commit himself by stating that the evident ill-health of the inhabitants was due to the selenium content of their food and concluded that the question was problematical and worthy of study.

By the investigators who have studied the selenium problem the most thoroughly, the public health aspect of the situation is limited exclusively to the affected areas. It should not be overlooked, however, that the largest part of the world's wheat is grown in semi-arid soils where selenium, if present, would tend to remain and perhaps even accumulate in the soil. Of equal importance is the contamination of food material by seleniferous sprays. Byers and Knight state that while it is true quantities of toxic foodstuffs have been produced and marketed, and that unless preventive measures are taken they will continue to be produced and marketed, no serious concern need be felt except in the areas concerned. In this connection it should not be forgotten that toxic areas in this country have been found in some 14 states and that the investigation of other areas is not yet complete.

Others tend to minimize the public health aspects of the problem by stating that in the general market it is impossible that any serious concentration of toxic food is likely to reach any individual. It is freely admitted, however, that "there exists the possibility that the health of the public as well as that of livestock might be involved since selenium bearing foods grown upon seleniferous soils also enters human dietary."

There is no doubt that the selenium problem is one of such magnitude that it cannot be ignored. It presents to research people and public health authorities a great responsibility. Not only should food supplies derived directly or indirectly from seleniferous areas be scrutinized, but special emphasis should be placed upon the protein concentrates or derivatives of those foods. Foods that have been sprayed with selenium-containing sprays should also be given consideration and soils catching the spray run off should be studied from the standpoint of the building up of seleniferous soils. Foods raised on soils exposed to the wash-off from certain mines and on soils in proximity to smelters should also be regarded in the same light. A new and equally important aspect of the problem is the strong likelihood of increasing seleniferous areas in irrigation districts using water containing selenium. This problem is of more than theoretical interest in the lower Colorado River since Byers demonstrated the presence of selenium in appreciable quantities. This same authority is responsible for the statement that "irrigation does not diminish the effect of selenium in plants when the water contains selenium." Furthermore, the use of such water for irrigation purposes in arid regions where the rate of evaporation is high may actually build up new seleniferous areas. Those considerations mentioned by Marcovitch in connection with fluorine should be considered here also. Food raised in these districts should also be studied from the standpoint of an increasing content of selenium. Last but not least is the consideration that should be given the worker in those industries where selenium is either used or is present as a by-product.

No more fitting conclusion can be given to this review than the following statement made by Smith, Franke, and Westfall:

More detailed information regarding the sources of selenium; accurate knowledge concerning the quantitative relationship between the selenium excreted to that ingested and stored in the tissues; more intimate knowledge concerning the chemical nature of the compound or compounds of selenium occurring in foodstuffs, and a thorough knowledge of the fate of these compounds in the body, are some phases of the general problem requiring solution before its public health significance can be fully appreciated.

To this must be added, of course, the dangers that may accrue in developing new seleniferous areas through spray processes, irrigation, and industrial practices and the marketing of foods raised in such areas; foods subjected to seleniferous sprays and the various concentrates made from these foods.

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Mass Immunization Against Diphtheria with Sordelli's Toxoid and Contact Immunization*

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IN Mexico diphtheria has been more frequent than was believed to be the case in other countries. An average of 1,295 deaths occurred annually from 1931 to 1936. The trend of mortality from this disease has been increasing from 1930 to 1936, as can be seen by the following death rates: 1930–5.4; 1931–6.5; 1932–7.8; 1933–7.4; 1934–7.5; 1935–7.0; 1936–7.6.[1]

Probably this is not an apparent increase but a real one, because the trend of most of the other communicable diseases is downward and for this reason it would not be wise to think that in the case of diphtheria the increase is due to better registration. Besides this, the increasing crowding of our rural population into the cities, due to social, political, and economic reasons, and the high percentage of susceptibles to diphtheria in our population, as we shall see later, are two factors that may explain the increase of morbidity and mortality from this disease.

For these two reasons diphtheria is a very important health problem in Mexico. Each year more attention is given to its control, and research work is now being done to improve methods and technics of control.

Diphtheria has been very prevalent in the past in most countries, and if it is now under control in many places, it is due to the constant and careful preventive measures taken, but as soon as these are relaxed the disease spreads. In some countries the mortality is rising, notably in Germany from 1931 to 1935; in England from 1932 to 1937; Poland from 1929 to 1934.[2] In some others, like Japan, it is stationary; in the United States and Canada, there have been some outbreaks that caused a number of cases and deaths. For all these reasons diphtheria is a disease that deserves careful and permanent attention from the public health authorities.

The main factor in the control of diphtheria has been active mass immunization and immunization of the contacts of cases. Several products have been used in active immunization, but the one most commonly employed has been Ramon's anatoxin, introduced in 1924.[3] This has the disadvantage that several injections are needed and in mass immunization this is a great obstacle to reach the proportion of im-

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munes necessary to protect the herd, since, for several reasons, many do not receive the second or the third doses. Ramon's anatoxin has also the disadvantage that it takes several weeks to induce immunity, and consequently it cannot be used to protect contacts of cases of diphtheria that have been already infected or may be infected within a few days or weeks. For this purpose antitoxin has been used; but the immunity that antitoxin confers lasts only 2 or 3 weeks, and after that the contacts may be still in danger of infection. It is not advisable to repeat the injections of antitoxin for reasons that are well known. What is done at present is to induce active immunity to diphtheria contacts 2 or 3 weeks after the injection of antitoxin. This procedure is not practical because it is necessary to follow up the contacts and to inject them several times.

To avoid the disadvantages found in mass immunization against diphtheria with Ramon's anatoxin and other products which are given in repeated injections, several investigators have tried to induce immunity with a single dose of concentrated and activated toxoids. The alum precipitated and the aluminium hydroxide activated toxoids are the most commonly used. Glenny, Pope, Waddington, and Wallace [4] proved that the precipitate made by alum in the diphtheria crude toxoid was more antigenic than the latter for the immunization of horses, and this was confirmed in human immunization by Park, by Wells, Graham and Havens. Now the use of this produce is very widespread in the United States, England, Scotland, and other countries. Cumming reported to the Office International d'Hygiene Publique that 85 per cent of the diphtheria immunizations in the United States are made with alum precipitated toxoid.[2]

Lindes Krom, Lang and Schmith,[5] and Schmith and Hansen,[6] activated the acid precipitated toxoid adding aluminium hydroxide ($Al(OH)_3$). This product has been extensively used in Denmark and Argentine. Sordelli modified the original technic for the preparation of the alumina activated toxoid and has reported great success with it for mass immunization.

For the immunization of contacts it would be very important to have a method by which it was possible to induce a rapid and lasting immunity, so that those exposed to infection could be protected immediately, and for a long time. This could be done if it were possible to induce simultaneously the passive and active immunity. This is not possible with antitoxin and Ramon's anatoxin because, as several authors have stated, particularly Rosenau,[7] if these two products are injected at the same time or a few hours or days apart, they combine and interfere with one another, nullifying their immunizing properties.

Schmidt and Kjaer, quoted by Leonard and Holm,[8] observed that toxoid precipitated with acetic and hydrochloric acids do not flocculate with antitoxin; in other words, they have lost their property to combine with antitoxin. Schmith and Hensen, quoted by the same authors,[8] state that "diluted diphtheria toxine treated with aluminium hydroxide are not stable in their flocculating properties in contact with antitoxin," and conclude from their investigations with alumina activated toxoid that it remains antigenic, notwithstanding that it has lost its combining property.

We observed that Sordelli's toxoid has lost its property of combining with antitoxin, and this gave us the idea that it might be possible to induce simultaneous immunity, active and passive, with Sordelli's toxoid and antitoxin.

This paper is intended to report on the investigations performed in Mexico

by us on mass immunization against diphtheria with Sordelli's toxoid and the simultaneous immunization, active and passive, of the contacts, with Sordelli's toxoid and antitoxin.

We divide the account of our investigation into two parts: the first dealing with mass immunization, and the second with the immunization of contacts.

MASS IMMUNIZATION

We Schick tested 4,309 persons of all ages. Readings were made from the first to the fourth day. We classified as susceptibles all who gave a positive or combined reaction, and as immunes those who gave a negative or pseudo-positive reaction. Three thousand, one hundred and ninety-two, or 74.1 per cent, were susceptibles, the percentage of susceptibles being higher at the lower ages, though 48.8 per cent of those 25 years of age or over were found susceptible. The percentage of adult susceptibles found in Mexico is higher than that found in other countries. The susceptibility to diphtheria of different age groups, as shown by the Schick test, is presented in Table I.

The immunes were not further taken into consideration. The 3,192 susceptibles were divided into 3 age groups. Group 1 comprises from 0 to 5 years age; group 2, from 6 to 10, and group 3, from 11 years on. Each group was subdivided into 3 subgroups. Those of subgroup I were injected with ½ cc. of Sordelli's toxoid; those of subgroup II with 1 cc., and those of subgroup III with 1½ cc.

The toxoid used was prepared in the Instituto de Higiene of Mexico according to the technic of Schmith modified by Sordelli, briefly described as follows:

From diphtheria toxin of 80 m.l.d. potency was prepared the anatoxin adding 0.4 per cent formalin and storing in the incubator until detoxification. One cc. of the anatoxin protected guinea pigs of 250 to 300 gm. weight against 5 m.l.d. To the anatoxin was added a 20 per cent sulfuric acid solution until a pH of 3.2 to 3.4 was reached. It was left to settle for 20 minutes and then centrifuged 1 hour at 3,500 r.p.m. The supernatant was discarded and the sediment redissolved in distilled water. To this solution was added NaOH until a pH of 7.6 to 7.8 was reached, and then enough distilled water was added to bring it up to 1/10 the original volume. Sterilization was done by filtration through Berkefeld candle and finally aluminium hydroxide (Al

TABLE I

Susceptibility to Diphtheria at Different Ages, of 4,309 Individuals, as Shown by the Schick Test

Age Groups	*Number Studied*	*Number Positives*	*Per cent*	*Number Negatives*	*Per cent*
0 to 1 year	285	267	93.68	18	6.32
2 years	250	236	94.40	14	5.60
3 "	270	245	90.74	25	9.26
4 "	282	242	85.81	40	14.19
5 "	290	244	84.14	46	15.86
6 "	313	253	80.83	60	19.17
7 "	432	357	82.64	75	17.36
8 "	409	291	71.15	118	28.85
9 "	312	210	67.31	102	32.69
10 to 14 "	1,169	684	58.51	485	41.49
15 to 24 "	174	103	59.19	71	40.80
25 on	123	60	48.78	63	51.22
Total	4,309	3,192	74.08	1,117	25.92

TABLE II

Per Cent of Negative Schick Reactors in Susceptibles Injected with Sordelli's Toxoid According to Age and Dose

From 20 to 307 Days Between Toxoid Injection and Schick Test

	½ cc.				1 cc.				1½ cc.			
Age Groups	*No. Studied*	*No. Negative*	*Per cent Negative*	*σ B*	*No. Studied*	*No. Negative*	*Per cent Negative*	*σ B*	*No. Studied*	*No. Negative*	*Per cent Negative*	*σ B*
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
6 months to 5 years	117	68	58.12	5.3	351	245	68.80	3.6	288	218	75.69	4.4
6 to 10 years	27	20	74.07	14.0	381	272	71.39	3.6	337	285	84.75	4.6
11 and over	7	5	71.43	27.4	162	136	83.95	6.6	132	108	81.82	7.1
All ages	151	93	61.60	5.02	894	653	73.00	2.44	757	611	80.70	2.93

$(OH)_3$) was added in the proportion of 4 mg. per cc.

The Sordelli's toxoid was prepared by G. Varela and Aguirre Colorado.

The lots of toxoid we used had from 10 to 15 L_f units per cc. Tests were always made for potency, sterility, and innocuity according to Government Standards.

Of the 3,192 susceptibles injected with toxoid, 1,802 were retested at intervals of 20 to 307 days, and 1,357, or 75.3 per cent, gave a negative reaction or, in other words, became successfully immunized; but it seems that the percentage of immunizations varied with the age of the persons injected, the dose employed and the time interval between injection and test, although the differences observed are not statistically significant.

The percentage of persons successfully immunized was greater among the higher ages, with the larger doses, and when the interval between injection and test was longer. The first statement is based on the figures in column 8 of Table II, and these figures were chosen because they have the lower probable errors. The second statement is based on the figures in the last line of Tables II and III; and the third on figures in column 8 and 2d, 3d and 4th lines of Table III.

On the average, a little more than 80 per cent of susceptibles injected with 1½ cc. (15 to 22.5 L_f) of Sordelli's toxoid became immune as shown by

TABLE III

Per Cent of Negative Schick Reactors in Susceptibles Injected with Sordelli's Toxoid, According to Dose and Intervals Between Toxoid Injection and Schick Test

All Ages

Days Between Toxoid Injection and Schick Test	½ cc.				1 cc.				1½ cc.			
	No. Studied	*No. Negative*	*Per cent Negative*	*σ B*	*No. Studied*	*No. Negative*	*Per cent Negative*	*σ B*	*No. Studied*	*No. Negative*	*Per cent Negative*	*σ B*
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
20 to 30	4	3	75.00	37.50	28	21	75.00	14.15	126	105	83.33	7.43
31 to 45	37	13	35.13	5.76	242	124	51.24	3.29	156	146	93.59	7.49
46 to 90	32	16	50.00	8.83	152	108	71.05	5.76	58	39	67.24	8.83
91 to 307	78	61	78.21	8.86	472	400	84.75	3.90	417	321	76.98	3.77
20 to 307	151	93	61.59	5.01	894	653	73.04	2.44	757	611	80.71	2.93

the Schick test, 73 per cent of the injected with 1 cc. (10 to 15 L_f) and 61 per cent of those injected with ½ cc. (5 to 7.5 L_f). These percentages are reached 20 days after the injection and are also found after 307 days.

The reactions observed in persons injected with Sordelli's toxoid were divided in local and general, and the locals in mild, moderate and strong.

We considered as strong local reactions those in which inflammatory signs were present at the site of the injections in an area of about 5 cm. in its longer diameter; moderate, when the area of inflammation was less than 5 and more than 2 cm. in diameter, and pain moderate; and mild reaction, when the area of inflammation was limited to less than 2 cm. in diameter and pain absent.

An average of 50 per cent had a local reaction, and 13 per cent a general reaction. Both reactions were a little more frequent with the larger doses, but no significant difference was observed with the age.

The local reactions were mild in 30.3 per cent, moderate in 48.2 and strong in 19.3.

The general reactions were always mild, consisting of a moderate rise of the temperature for a few hours, with the exception of one case in which an urticarial exanthem was observed.

We also observed the formation of abscesses at the site of the injection in 8 cases among the 3,192 persons injected with Sordelli's toxoid; but the evidence pointed to careless technic in making the injection as the cause. *Staphylococcus pyogenes* was found in the pus obtained by aseptic puncture of 4 abscesses.

THE IMMUNIZATION OF CONTACTS

As said, I conceived the idea that it could be possible to induce simultaneously passive and active immunity against diphtheria, with antitoxin and Sordelli's toxoid, because I observed that this toxoid had lost its property to combine with antitoxin. To prove this idea we performed laboratory investigations. Two lots of several guinea pigs each were injected with appropriate doses of diphtheria antitoxin and Sordelli's toxoid, at the same time but at different sites. To test the production of passive immunity, the guinea pigs of the first lot were injected with 5 m.l.d. of diphtheria toxin 24 hours after the injection of antitoxin and toxoid. Two normal guinea pigs were also injected with diphtheria toxin as controls.

Within 3 days after the injection of the toxin, the controls died, but the guinea pigs injected previously with antitoxin and toxoid survived and did not show signs of illness during the following month.

In order to test the active immunity induced by the simultaneous injection of toxoid and antitoxin, the second lot of guinea pigs were injected with 5 m.l.d. of diphtheria toxin 30 days after the injection of antitoxin and toxoid. Two normal guinea pigs were also injected with toxin, as controls. Within 24 hours after the injection of the toxin, the controls died, but the guinea pigs that had been previously injected with toxoid and antitoxin survived and did not show signs of illness. The protocols of these experiments have been published elsewhere.[9]

From the experiment described we drew the 2 following conclusions:

1. The Sordelli's toxoid and the diphtheria antitoxin confer simultaneous immunity, active and passive, when they are injected at the same time, but at different sites in doses at which the serum confers passive and the toxoid active immunity when injected separately.

2. When Sordelli's toxoid and diphtheria antitoxin are injected at the same time but at different sites, they do not combine *in vivo* and do not interfere with one another.

Based on these 2 conclusions we made investigations in the field and in human beings.

TABLE IV

Schick Reactions Resulting After Simultaneous Injection of Diphtheria Antitoxin and Sordelli's Toxoid in 90 Susceptible Individuals

Ages	Total of Individuals Studied	First Schick 1 to 3 Days After Injection				Second Schick			
		Positive		Negative		1 Month After		2 Months After	
		No.	%	No.	%	Pos. No.	Neg. No.	Pos. No.	Neg. No.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
0 to 4 years	29	..	..	29	100.0	2	8	4	8
5 to 9 "	26	..	..	26	100.0	2	10	4	9
10 to 14 "	12	..	..	12	100.0	..	7	..	4
15 to 20 "	4	..	..	4	100.0	..	1	1	2
20 and over	19	2	10.5	17	89.5	2	10	..	6
Totals	90	2	2.2	88	97.8	6	36	9	29

Total Negative React. 81.2 %

The investigations were made among contacts of diphtheria cases and carriers. The contacts were Schick tested; those who gave a negative reaction (immunes) were not taken into consideration. The Schick positives (susceptibles) were injected with 1,000 to 1,500 A.U. of diphtheria antitoxin and with 1 cc. to 1½ cc. of Sordelli's toxoid. These products were injected subcutaneously, at different sites, but at the same time.

Within 24 to 72 hours after the injection of toxoid and antitoxin a second Schick test was made to see if passive immunity was established and 1 or 2 months later a third Schick test was made to see if active immunity was induced.

In accordance with the plan outlined 90 susceptible contacts of diphtheria cases or carriers were injected with Sordelli's toxoid and diphtheria antitoxin, and Shick tested before and after the injection: 88, or 97.8 per cent gave a negative Schick test within 24 to 72 hours after they had been injected, and 2, or 2.2 per cent, gave a positive reaction. It must be said that the 2 persons who remained susceptible were adults injected for some reason with only 900 A.U., a dose which is insufficient, as we know.

Of the 90 susceptible contacts injected with toxoid and antitoxin, and Schick tested before and after the injection, only in 80 was a third Schick test made 1 or 2 months after the injection. Among 42, the Schick test made 1 month after the injection, 36 gave a negative reaction and 6 a positive one. In 38 the test was made 2 months after the injection—29 gave a negative reaction and 9 a positive. Taking into consideration the Schick tests made 1 month and 2 months after the injection of toxoid and antitoxin, the result was negative in 82.2 per cent of the contacts injected (see Table IV).

In 132 persons injected with toxoid and antitoxin it was possible to observe the reactions that followed with injection of these products.

In 96, or 72.7 per cent, a local reaction was observed, of which 18, or 13.5 per cent, were strong; 26, or 19.7 per cent, were moderate; and 52, or 39.4 per cent, were mild. In 34, or 27.5 per cent, a general reaction was observed (see Table V).

The criterion followed to classify the reactions was the same as stated above.

TABLE V

Frequency of Local and General Reactions Following Simultaneous, Active and Passive, Immunization

Ages	Total of Individuals Injected	Local Reactions Variety					General Reactions	
		Number	Strong	Moderate	Mild	None	Pos. Number	Neg. Number
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1 year	10	9	3	3	3	1	5	5
2 years	12	8	..	..	8	4	5	7
3 "	10	7	2	2	3	3	4	6
4 "	12	10	4	2	4	2	5	7
5 "	7	6	3	1	2	1	..	7
6 "	9	7	..	1	6	2	4	5
7 "	9	6	..	1	5	3	1	8
8 "	7	5	..	1	4	2	1	6
9 "	7	5	2	1	2	2	1	6
10 "	8	6	2	2	2	2	2	6
11 "	2	2	..	1	1	..	..	2
12 "	5	4	..	2	2	1	1	4
13 "	1	..	..	..	..	1	..	1
14 "	3	1	1	..	..	2	..	3
15–24 years	8	6	..	4	2	2	1	7
25 and over	22	14	1	5	8	8	4	18
Totals	132	96	18	26	52	36	34	98
Percentages	100.0	72.7	13.6	19.7	39.4	27.3	25.7	74.3

SUMMARY AND CONCLUSIONS

We have described the technics and methods followed in mass immunization against diphtheria with Sordelli's toxoid. The percentage of persons successfully immunized after the injection of ½ cc., 1cc. or 1½cc. of toxoid has been specified. The correlation of the doses of the product, age of the persons injected, and time between the injection and immunity test, with the percentage of successful immunizations have been studied. The frequency of local or general reactions after the injection of Sordelli's toxoid and their intensity were observed.

We have also described our studies as to the simultaneous immunization, active and passive, of the susceptible contacts of diphtheria cases and carriers, with Sordelli's toxoid and antitoxin and results obtained.

From these studies we draw the following conclusions:

1. The Sordelli's toxoid, acid precipitated and aluminium hydroxide activated, when injected in a single dose of 1½ cc., having 10 to 15 L_f units per cc., confers immunity to an average of 80 per cent of the susceptibles of all ages so injected.

2. The immunity induced with Sordelli's toxoid is already acquired 20 days after the injection and remains at the same level at least 307 days later, according with our observations.

3. The higher proportions of successful immunizations with Sordelli's toxoid are observed in the older age groups. Probably this is an indication that the doses must be higher for the preschool age children than for school age children and adults.

4. Local reactions at the site of the injection of toxoid were observed in about 50 per cent of the persons injected, and general reactions in 13 per cent; but both reactions were always mild and transitory. They do not contraindicate the use of Sordelli's toxoid.

5. We believe that Sordelli's toxoid is a product that can be used with advantage in mass immunization against diphtheria since about 15 L_f units in a single injection are enough to immunize 80 per cent of the persons injected; but we think that it would be convenient to prepare and use more potent toxoids, probably with not less than 30 L_f units

per cc., in order to obtain higher proportions of successful immunizations.

6. Simultaneous immunization, active and passive, against diphtheria, can be induced with Sordelli's toxoid and diphtheria antitoxin, if these products are injected subcutaneously, but at different sites, in doses in which the toxoid confers active and the antitoxin passive immunity when used separately.

7. We believe that the simultaneous immunization, active and passive, with Sordelli's toxoid and antitoxin should be the method of election for the immunization of susceptible contacts with diphtheria cases or carriers, since with this method they will be protected immediately and for a long time, or permanently. Probably alum precipitated toxoid may be used as well as Sordelli's toxoid for this purpose.

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Administration of Laws for the Prevention and Control of Occupational Diseases*

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LEGISLATION providing for the compensation for and prevention of occupational diseases has been the result of a definite economic need in our present-day industrial relations. In the same manner that Workmen's Compensation Acts were necessary to provide some new method to adjust disputes between employer and employee as to the liability of an employer for accidental injuries, so occupational disease compensation acts have become essential to provide the medium for the settlement of claims for occupational disease injuries. Industrialists today accept the obligation imposed upon industry to provide compensation for injuries to their employees arising out of and in the course of employment, no matter whether they are caused by occupational disease or accidental means.

One of the most serious problems that have arisen in connection with the administration of the Workmen's Compensation Acts has been the problem of disease caused or aggravated by accidental injuries. There had already developed the tendency for these laws to be administered as general health insurance laws, and this tendency became even more acute with the adoption of laws providing compensation for occupational disease injuries. The primary purpose of the compensation statutes is to compensate only those injuries that are characteristic of and peculiar to the employment where the hazard of injury occurs. If there were no such limitation as to the scope of the compensation acts, they would inevitably be administered as general health insurance laws, which was certainly not the intention or purpose sought to be accomplished by their enactment.

The American Public Health Association has had as one of its major interests the subject of industrial hygiene, and your officers, committees, and members are to be commended for the part the Association has played in the protection of the health of workers engaged in trade and exposed to the hazards of industrial disease. You have tendered your assistance to compensation commissions and legislative committees in the draft and preparation of occupational disease laws that were later enacted, and your As-

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sociation is now concerned with the administration of these laws. Many perplexing problems have already arisen and will continue to arise in the course of this administration, and the continued assistance and interest of your Association is essential in order for this administration to be successful.

In the United States occupational disease compensation laws have been of comparatively recent enactment; the States of California and Wisconsin enacted such laws in 1919; the State of New Jersey in 1924; North Dakota in 1925; Minnesota and Connecticut in 1929; and the remaining 15 states have enacted their laws since 1930.* During this period public hysteria developed about the subject of occupational diseases in industry. I do not mean to be critical of this fact, because it has served to emphasize an industrial problem which should have received legislative attention. However, one of the results of this hysteria has been the hasty enactment of ill-advised laws, whose provisions have led to difficulties of administration and the occasion of unfortunate industrial conditions that might have been avoided by more careful supervision of the legislative programs. The experience in the administration of many of these laws has not extended over a sufficient period of time to appraise properly their merits or demerits. It is to be regretted that this legislation has not been more uniform in certain of its aspects, although future amendments may tend toward uniformity and remove some of the inequities that at present exist. None of the laws so adopted are perfect; many of their provisions are objectionable; and, in the course of their administration, there have developed and will continue to develop problems that could not have been foreseen at the time of their enactment. In every state questions have arisen, making necessary the judicial construction of these laws in order to determine the liabilities of employers and the benefits granted to claimants thereby.

As typical of the confusion that has arisen with respect to certain of these laws, it is interesting to review certain cases wherein judicial interpretation was essential in order to determine the scope of the laws so enacted.

You are all familiar with the type of occupational disease law that provides what is known as "general coverage" for all occupational disease injuries. These laws do not schedule or classify the diseases that are compensable, but purport to make compensable any and all occupational diseases. As an example, consider the following provisions of the laws of the States of New York, Connecticut, and Illinois.

The New York Workmen's Compensation Act was originally amended to compensate a scheduled list of occupational diseases. By the Acts of 1935, Chapter 254, the following was added to the schedule: "Item 28. Any and all occupational diseases." The law itself does not define the term "occupational disease," and you will readily recognize the need for judicial interpretation of this term in order to determine the scope of the law.

The Connecticut Compensation Act was amended in 1927 to provide compensation for accidental injuries and "occupational disease as herein defined." The Act contains the following definition of occupational disease:

> The words "occupational disease" shall mean a disease peculiar to the occupation in which the employee was engaged and due to causes in excess of the ordinary hazards of employment as such.

* Delaware—1937
Illinois—1936
Indiana—1937
Kentucky—1934
Massachusetts—1932
Michigan—1937
Missouri—1931
Nebraska—1935
New York—1930
North Carolina—1935
Ohio—1931
Pennsylvania—1937
Rhode Island—1936
Washington—1937
West Virginia—1935

The occupational disease law adopted by the State of Illinois in 1936 contains the following definition of the term "occupational disease."

> The term "occupational disease" means a disease arising out of and in the course of employment. Ordinary diseases of life to which the general public is exposed outside of the employment shall not be compensable, except where the said diseases follow as an incident of an occupational disease as defined in this section.

What is the meaning of the term "occupational disease" as set forth in these statutes and what diseases that arise out of and in the course of employment are thereby made compensable?

It is interesting to note the judicial interpretation of the courts construing the term "occupational disease" and defining the scope of the law granting compensation therefor.

The case of *Goldberg v. 954 Marcy Corporation,* reported 12 N. E. Rep. (2nd) at page 311, involved an appeal from the action of the Appellate Division, sustaining an award granted by the New York Compensation Board to the claimant for an alleged occupational disease injury. The duties of the claimant required her to sell tickets for a motion picture theatre in a small sidewalk booth which was heated by an electric heater. Her claim set forth that her legs became weakened by the heat and that on her way to the doctor's office for medical attention, she fell and sustained a fracture of the ankle. I quote the following averments of her claim:

> My condition was caused by the electric heater in the cash box. It drew the blood out of my feet and caused blotches and veins to come out, making my feet weak.

The referee awarded compensation on the theory that the injury sustained was both an accident and an occupational disease. The Workmen's Compensation Board sustained this finding on appeal, which was likewise affirmed by the Appellate Division. The New York Court of Appeals, in the case cited above, affirmed the award on the ground that the plaintiff had suffered accidental injury arising out of and in the course of her employment and, in the course of its opinion, in refusing to affirm the appeal on the ground that the claimant had suffered an occupational disease, said:

> An occupational disease is one which results from the nature of the employment, and by nature is meant, not those conditions brought about by the failure of the employer to furnish a safe place to work, but conditions to which all employees of a class are subject, and which produce the disease as a natural incident of a particular occupation, and attach to that occupation a hazard which distinguishes it from the usual run of occupations and is in excess of the hazard attending employment in general. Thus compensation is restricted to disease resulting from the ordinary and generally recognized risks incident to a particular employment, and usually from working therein over a somewhat extended period. Such disease is not the equivalent of a disease resulting from the general risks and hazards common to every individual regardless of the employment in which he is engaged.

It is a fact that today, in New York State under the present law, there are pending claims for such diseases as asthma, tuberculosis, pneumonia, colds, bronchitis, and other human ills not peculiar to or characteristic of the trade or employment wherein the claimant is engaged. I do not mean to imply that compensation will be awarded for all such cases and express the hope that the New York statute will never be construed to provide general health insurance for employees. However, there is always present the danger of awards for disease injuries that are not truly occupational in their nature.

A case that arose in connection with the construction of the Connecticut statute is that of *Madeo v. I. Dibner & Bro., Inc.* (1936), 186 Atl. 616. There the claimant contracted pul-

monary tuberculosis while employed in a dress factory. In denying compensation, the court, referring to the definition quoted above, said:

> To award compensation to the claimant in this case would be to go against the legislative intent emphasized in the amendment of 1927 and to violate the statute as it has since stood.

The Illinois statute above cited became effective in 1936, and to date there does not seem to be any reported opinion wherein the meaning of the term "occupational disease" has been judicially construed. However, there are claims now pending under this statute for many of the common ills of life, not peculiar to any particular occupation, such as "pneumonia, flat feet, bronchitis, etc." It is inevitable that cases involving such diseases will be passed upon by the courts to determine whether or not they are compensable under the statute.

Recognizing the difficulties of administration that are caused by the inherent defects in these laws, I would like to discuss certain of their administrative provisions that are of particular interest to your Association. These subjects relate to provisions for the determination of occupational diseases and the extent of disability arising therefrom, together with provisions for control and prevention.

I. Provisions for the creation of Medical Boards or the appointment of medical examiners, defining their functions.
   1. To advise the administrative agency whether or not the claimant is suffering from the occupational disease for which compensation is claimed.
   2. To determine the degree of disability caused by the occupational disease.

II. Provisions for the establishment of Bureaus of Industrial Hygiene, defining their functions.
   1. Maintenance of an occupational disease reporting system.
   2. Establishment of rules and regulations for the control and prevention of occupational diseases.
   3. Maintenance of a factory inspection service.

PROVISIONS FOR THE CREATION OF MEDICAL BOARDS OR THE APPOINTMENT OF MEDICAL EXAMINERS

The adoption of compensatory legislation makes necessary the delegation to some administrative agency of the power to determine whether or not the claimant is suffering from an occupational disease, and the extent of disability arising therefrom. In many occupational disease claims the medical testimony offered by the claimant and the employer will be controverted and expert medical evidence that is highly technical will be offered on behalf of the contesting litigants with resulting confusion and uncertainty in the minds of the agency charged with the administration of the law. The fees payable to expert witnesses are substantial and the parties litigant may, in given instances, expend exorbitant sums in order to accomplish successful results. The employee, unable to finance such trials, is at a distinct disadvantage and may not have available competent medical advice to present his case properly. Under such circumstances, what is the administrative agency to do? To whom may it turn for unprejudiced nonpartisan advice? What agency can be established as representative of the State, to serve the function of determining these all-important medical questions upon which the award or denial of compensation will depend? An answer to this query has been found in many of the occupational disease compensation acts, wherein provisions have been made for the appointment, either of a medical board, or of special medical examiners.

A medical board, composed of competent, impartial physicians, representing the State, disinterested as a party in the proceeding, benefitting by its continued experience in handling this type of claim, is the best agency to

determine medical questions. In order to accomplish the appointment of a board composed of competent, non-political appointees, it may be well to consider the suggestion that the appointments should be made by the governor of the state from a list of nominees to be submitted by the dean or deans of the medical departments of state universities or other medical schools within a given state. There should be the requirement that appointees should have had extensive practice and experience in the diagnosis, treatment and care of occupational diseases. The board should be empowered to make rules regulating its procedure, to contract for laboratory work, to make necessary investigations of working conditions, to provide for the ordering of autopsies, to examine claimants, and to determine all medical issues presented by the claim. All claims involving occupational diseases should be referred to this board for investigation, hearing, and report, which report, when completed, should be filed in the record of the case. At hearings before the board, either party should be given the privilege of offering testimony of its own doctors or such other witnesses as they may desire, and the further privilege of cross-examination of witnesses offered by the other party.

In those states where the findings of the medical board are final, the board should continue its jurisdiction over the case, with the privilege of reopening it at any time it elected to do so, for the purpose of reviewing, reversing, or modifying its decision in such manner as it deems proper. In those jurisdictions where the board serves solely in the capacity of advising the administrative agency, its members should offer testimony as to their findings before the administrative agency and be subject to examination and cross-examination by the parties litigant.

FUNCTIONS OF MEDICAL BOARDS OR MEDICAL EXAMINERS

1. To advise the administrative agency whether or not the claimant is suffering from the occupational disease for which compensation is claimed—

Upon the filing of a claim for occupational disease compensation, the claimant should be required to submit to such medical examinations as the medical board deems necessary or proper to determine the existence of injury and the extent of disability from which the claimant is suffering. In the event that the claimant refuses to subject himself to such examination, the payment of compensation should be suspended until he does submit. Broad powers should be granted to study the condition of the patient over such period of time and under such conditions as are necessary for the proper determination of injury. Either party litigant should have the privilege of offering to the medical board the testimony of its own medical advisers, so that the right of each party to present its own evidence would be retained. The witnesses so offered should be subject to examination by the other party and by the individual members of the medical board. The medical records, laboratory and X-ray findings of either party should be offered in evidence and made an official part of the record of the proceedings before the medical board.

Provision is made, under many of the occupational disease laws, for the conduct of autopsies in death cases. Such autopsies may be ordered by the medical board for the purpose of determining the cause of death since, in the case of many of the occupational diseases, an autopsy will afford the best evidence as to whether or not death was caused by the occupational disease for which claim is made. The board should have the power to order such autopsy and should supervise its conduct, with

the privilege to its members to attend and participate in the examination of the decedent. The findings should be certified by the board as a part of the record in the case.

2. To determine the degree of disability caused by the occupational disease—

One of the most difficult factual determinations involved in occupational disease compensation is that of the extent of disability arising from certain occupational diseases. The formulae that have been established in the Workmen's Compensation Acts providing compensation for accidental injuries are not and cannot be made applicable to occupational disease claims. In the case of many of the occupational diseases the medical profession has not yet agreed upon a satisfactory method for the determination of partial disability. In any given case each party litigant could offer its own testimony as to the extent of the injury and the degree of disability that would be in hopeless conflict with the testimony offered by its opponent. It is recognized that this problem is one that can only be solved after extensive experience in the administration of occupational disease laws and the adoption of a satisfactory method, accepted by the medical profession, for the determination of the degree of disability.

In view of the perplexity of the question and the desire to provide the most expeditious method for the determination of the extent of injury and the degree of disability, it is suggested that this function should be served by the medical board, which should be better able to decide these questions.

Of the occupational disease laws now effective, the laws of the States of Connecticut, Delaware, Missouri, Nebraska, and New Jersey make no provision for the appointment of medical boards. In the laws of the other states such provisions are made. The laws of the States of Massachusetts and Michigan make the diagnosis and opinion of the board upon medical questions binding upon the agency administering the law. In the States of California, Illinois, Indiana, Kentucky, Minnesota, New York, North Carolina, North Dakota, Ohio, Pennsylvania, Rhode Island, Washington, West Virginia, and Wisconsin, provisions are made for medical boards and examining physicians to act in an advisory capacity to the agency administering the law. The importance of medical boards cannot be over-emphasized and it is submitted that the successful administration of occupational disease laws will depend upon the proper determination of medical questions of fact that are involved in these claims.

Is it not reasonable to believe that the most satisfactory determination of medical issues presented by claims arising under these laws could be made by a board of examining physicians? If the determination of these questions is left to lawyers, judges, or other bodies of laymen, each given case will require the parties litigant to educate the administrative agency in the intricacies of the industrial disease for which compensation is sought. There is no agency in the United States whose voice should be more effective for the accomplishment of this result than the American Public Health Association, and it is to be hoped that it will be the policy of your Association to extend its support and coöperation to the state medical agencies that are charged with the administration of these laws.

PROVISIONS FOR THE ESTABLISHMENT OF BUREAUS OF INDUSTRIAL HYGIENE

There is one phase of the subject of the administration of occupational disease legislation that merits your careful consideration. That is the subject of prevention and the legislative provisions designed for the protection of

employees against the hazards of occupational disease. It is to be regretted that legislation heretofore enacted by the several states has placed primary emphasis upon compensation, while the subject of prevention has not received the attention that has been justified. In most of the states having occupational disease laws the only legislative methods provided for the control and prevention of occupational diseases are found in the health and labor laws, which are not primarily adaptable to the peculiar problems presented by occupational disease hazards. However, in several of the states, there is specific provision in the occupational disease law for the establishment of bureaus of industrial hygiene and a method provided for the adoption of rules and regulations designed for the control of occupational disease hazards. Let us refer briefly to legislative provisions of this type.

Article 4 a, section 65, subsection 2 of the Workmen's Compensation Law of New York, effective June 6, 1936, provides as follows:

> The industrial commissioner and the industrial board are hereby required to add to the industrial code, as provided in sections twenty-eight and twenty-nine of the Labor Law, effective rules and regulations governing the installation, maintenance and effective operation in all industries and operations wherein silica dust or other harmful dust hazard is present, of approved devices designed to eliminate such harmful dusts and to promulgate such other regulations as will effectively control the incidence of silicosis and similar diseases.

It will be noted that the provisions of this section are mandatory and that the industrial commissioner and the industrial board are required to adopt effective rules and regulations. Pursuant thereto, the New York Industrial Commissioner has proceeded to accomplish the purposes designed by the law. Before the promulgation of proposed rules and regulations, the Commissioner has instituted surveys for the purpose of studying operating conditions in those industries in New York State where hazards exist, to determine the extent of the hazard and the effect of the proposed rules and regulations upon those industries that will be subject thereto. He has appointed code committees, whose representatives have been chosen from representatives of manufacturers, labor organizations, state departments, manufacturers of protective equipment, and industrial hygienists so that he may have the advantage of the experience and points of view of those who are best informed upon the problems thus presented.

The first code committee made a study of rock drilling and formulated a code for that industry which has since been adopted. A second code committee was appointed to draft a foundry code and that committee is presently engaged in its research. During the present fall and winter it will probably recommend the formal code to the board, which will then be adopted. There are indications of the appointment of other code committees for those industries wherein hazards exist. These code committees conduct public hearings and then promulgate rules and regulations for the protection of workmen in certain specific industries. When adopted, the code becomes law and must be complied with by the particular industries that are subject thereto within the state.

Of similar nature is Section 39 of the California Workmen's Compensation Law, Chapter 586, which provides as follows:

> Sec. 39. The commission shall have power, after a hearing had upon its own motion or upon complaint, by general or special orders, rules or regulations, or otherwise:
>
> (1) To declare and prescribe what safety devices, safeguards or other means or methods of protection are well adapted to render the employees of every employment

and place of employment safe as required by law or lawful order.

(2) To fix such reasonable standards and to prescribe, modify and enforce such reasonable orders for the adoption, installation, use, maintenance and operation of safety devices, safeguards and other means or methods of protection, to be as nearly uniform as possible, as may be necessary to carry out all laws and lawful orders relative to the protection of the life and safety of employees in employments and places of employment.

(3) To fix and order such reasonable standards for the construction, repair and maintenance of places of employment as shall render them safe.

These provisions enable the commission to require the installation of protective machinery and equipment or take any other steps that are necessary, in the commission's judgment, for the prevention and control of occupational diseases. It is apparent that provisions of this type are vitally important if the incidence of occupational diseases is to be controlled.

There are also provisions in the health, labor, and compensation laws of all the states that can be administered for the prevention and control of occupational diseases. It would appear to be desirable to assign to one state department or to a board of industrial hygiene the administration of those laws that relate to the protection of employees from the hazard of occupational diseases. Such a board, with trained personnel, could unify the activities of various state departments and eliminate duplication of supervision, inspection, and control that would inevitably result if such duties were undertaken by more than one state department.

FUNCTIONS OF BUREAUS OF INDUSTRIAL HYGIENE

Maintenance of Reporting System—

In most of the industrial states, there is at present no effective system for maintaining reports and classifications of occupational diseases. It is to be regretted that the importance of this feature has been overlooked by those interested in the subject of industrial hygiene. The maintenance of such a system would be of material value to make known to state officials those industries wherein potential occupational disease hazards exist, so that effective methods for their control could be adopted. Furthermore, the reported diseases could be classified as to extent of disability sustained by the employee, and data could thus be accumulated that would constitute a valuable record for the purpose of determining the effectiveness of the state's program for prevention and the industrial cost occasioned by disease injuries.

Establishment of rules and regulations for the control and prevention of occupational diseases—

This is the most important function that could be served by the bureau of industrial hygiene. Prior to the adoption of rules and regulations extensive surveys and studies should be made of those industries where occupational disease hazards exist, for the purpose of determining the extent of such hazards and the peculiar operating conditions in given plants which gave rise thereto.

After the completion of its survey of given industries, the bureau could then formulate and recommend for adoption rules and regulations for the control of occupational disease hazards therein that they deemed necessary to promulgate an adequate and effective program of control. When adopted, such rules and regulations should have the force and effect of law. They should only become effective after opportunity for full public hearing, so that any industry that might feel aggrieved by their provisions could be heard and have the opportunity to obtain necessary amendments that the bureau might agree were desirable.

Maintenance of Factory Inspection Service—

Under the various state health, labor, and occupational disease laws, factory inspection has been assigned to different state departments for different purposes. For example, factory inspectors of state departments of health are concerned with matters of sanitation; inspectors of state departments of labor are concerned with the compliance of industry with particular labor laws, such as hours of labor; inspectors of the industrial commission administering the Workmen's Compensation Act, are concerned with the compliance of employers with safety provisions of the compensation law. Where inspection service is thus divided among several state departments, the inevitable result will be that one department will adopt the attitude that it will let some other department take care of a certain type of inspection. The bureau of industrial hygiene could unify such factory inspection service as would be necessary to control industrial disease hazards effectively in the industries within the state. With proper inspection service occupational disease hazards would be discovered, called to the attention of the employer, and remedies for the conditions found.

Every effort should be made to assist industry in the solution of objectionable methods of manufacture that may tend to cause occupational disease hazards. There are many industries that do not have the personnel, equipment, or necessary technical information to understand the extent of the disease hazards in their plants or to install effective methods for their control. The department should assist such industries to correct faulty operating conditions, which could be done at a minimum of cost to the state. Experience has indicated that the greatest number of occupational disease hazards are not within the large industrial plants, operated by companies that are financially able to perfect their methods of control, but do exist in the smaller units of production where capital resources are not available for the necessary engineering control. Such industries would welcome the bureau's assistance to minimize their hazards effectively and, with intelligent direction, many of the existing hazards could be eliminated at a minimum of cost.

CONCLUSION

Occupational disease compensation laws are the result of definite economic need to afford to injured employees adequate compensation for injuries they have sustained during the course of employment. At the time of their enactment employers have been concerned about the additional cost to which they have been subjected, but to date it does not appear that these laws have placed an unjust burden upon industry. It is to be hoped that employers as a group will coöperate in the administration of these laws. It is too early to predict whether or not that administration will be successful, but if they fail to accomplish the purpose for which they are designed, they should fail because of their inherent defects and inequalities, and not because of the attempt by employers to avoid the imposition upon them of costs for compensating injuries resulting from the operations to which their employees have been subjected.

Those of you who have made special studies of occupational diseases know and appreciate the problem that these laws present to industry. We also know from experience that the cost of prevention of injuries, be they caused by accidents or occupational disease, is but a small part of the potential liability imposed by law for compensation. It is good business today for employers to prevent, rather than to compensate occupational disease in-

juries, and I hope that in the future, primary emphasis may be placed upon prevention so that compensation will not be necessary.

DISCUSSION

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EVERYONE doubtless agrees with the ideas presented in Mr. Waters's excellent paper, but there are certain difficulties that we may discuss to advantage. We should keep in mind among other things, that—

1. The successful administration of these laws involves an intimate knowledge of the intricate associations of employment, disease, and disability—and what is of equal importance, the establishment of cause and effect relationships.

2. Many of the difficulties arising thus far have been occasioned by a belief in the fallacy that methods used in reference to accidental injuries were also of use here. The administration of the legal problems of occupational diseases is much more complicated, especially as to etiology, diagnosis, and differential diagnosis.

3. The use of vague and indefinite wording in our terminology and definitions, and in the laws, breeds controversy. We commonly speak of compensation for occupational diseases—*diseases* are not compensable but *disability* is—the theory of the law is that the employee is compensated for disability which incapacitates him for his work. This is but one example of common loose usage.

4. There are and will continue to be (to borrow a phrase from Dr. Nau) "chiselers on both sides."

There have been many attempts to define the term occupational disease with some fairly good results from these attempts; but we have to remember that whatever definition may seem to be satisfactory medically, must eventually be construed by the courts. The language of the court in Goldberg vs. 954 Marcy Corporation hardly leaves room for doubt as to what is legally meant by the term "occupational disease." Of course there would be no necessity for such construction where the so-called schedule system of naming the diseases is in effect.

I am in hearty agreement regarding the suggestion of the appointment of medical boards, especially in reference to the *competency, impartiality,* and *non-political affiliations* of the personnel composing them. Let us not however, overlook the fact that such men are unusual, and furthermore it should be emphasized that the tenure of office should be secure and the financial consideration commensurate.

The technical problems assignable to a medical board are obviously of such nature that they cannot be appropriately handled by non-medical persons. You will recall that Kessler made some statement such as this in his book *Accidental Injuries* in 1931.

The industrial hygiene bureaus have done very effective work in the several states. A reporting system would be of tremendous importance to the industrial epidemiologist, but we must first convince the employer that he will not be penalized if he reports his cases regularly.

Since the time is far too short for the adequate and detailed discussion which Mr. Waters's excellent paper deserves, may I make the following suggestions for the thoughtful consideration of the officers and the Section Council:

1. The advisability of the creation of a medical board committee especially for the

purpose of studying the functions of medical boards and supplying a list of qualified physicians in the various states

2. The advisability of the creation of a legislative committee for the purpose of advisory work in reference to the formation and administration of laws and codes.

Legislators, administrators, and allied workers need adequate professional advice and guidance. It is time that we threw off our reaction of shyness to the important medico legal phases of this question. Surely no other group has been so close to the various developments in this field and certainly we have a definite responsibility to the public to make our knowledge and experience readily available.

Water-Borne Outbreak of Brucella Melitensis Infection

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AN outbreak of at least 80 cases of brucelliasis with 1 death occurred on the campus of Michigan State College, East Lansing, during December, 1938, and January, 1939. All persons attacked were either students in bacteriology or were associated with the bacteriology building during December. In the basement of this building there is a laboratory devoted to the study of brucella organisms and the production of "brucellin" and other materials for diagnosis and treatment of brucella infection. Prior to February 4, on which date the authors were requested to participate in the investigation, it had been demonstrated by the college authorities that several persons were infected with Brucella melitensis, giving positive blood cultures.

DIAGNOSIS

The majority of patients gave a history of an onset with chills, severe headache, and intermittent fever, followed in a few days by increasing weakness, general myalgia, anorexia, insomnia, nausea, constipation, high fever, and delirium. In several there was a particularly troublesome bronchitis resembling that associated with influenza. There were some subclinical or latent cases with a history of only transitory malaise or no symptoms at all, discovered only by laboratory examinations. A few of the latter had positive blood cultures but gave no history or evidence of being ill. Confirmation of diagnosis was available for the 80 cases reported. A summary of the laboratory findings is shown in Table I.

EPIDEMIOLOGY

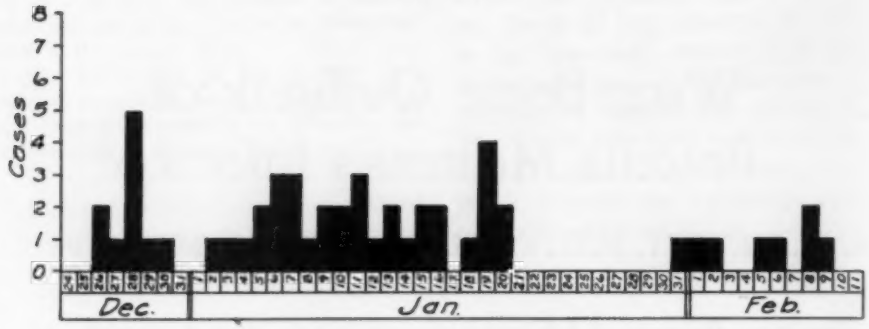
The distribution of the cases by dates of onset is shown graphically in Figure I.

TABLE I

Laboratory Findings

Blood Culture Br. Melitensis	*Agglutination*	*Skin Test*	*Phagocytosis*	*Totals*
X	X	X	X	35
	X	X	X	40
		X	X	5
Totals 35	75	80	80	80

FIGURE I



Eleven gave a history of having had chills, headache, and fever during the Christmas holidays and several students appeared at the college hospital for treatment on the day classes were resumed after vacation. The onset of undulant fever is characteristically insidious and many of the patients were uncertain of the actual date on which illness began. There is evidence, however,[1] that the incubation period varies widely and this probably accounts for the distribution shown in Figure I. There were 210 students enrolled for laboratory courses in bacteriology during the first semester, divided into 8 classes, all taking the introductory course and working with non-pathogenic bacteria exclusively. These classes worked in the laboratories on the second and third floors of the building on the days and time schedule indicated in Table II.

It will be noted that frank clinical illness was present in 37, and 28 were latent or subclinical. The attack rate varied with each class but out of a total exposure, in the regular laboratory classes, this rate was 30.9 per 100. Only one clinical case occurred among students in classes 2 and 3, but no information could be obtained from college authorities relative to laboratory data as to whether it was obtained for the members of these classes.

In addition to the 65 cases in the regular classes 15 other cases occurred. Ten of these were students in other courses who used the same laboratories as the regular students for special assignments in parasitology, poultry pathology, etc., one a plumber who

TABLE II

Student Data

Class	*Time Schedule*	*Location of Laboratory*	*No. in Class*	*No. Infected*		*Attack Rate*
				Frank	*Latent*	*Per cent*
1	M-F 8–10	2 Floor	28	9	3	42.8
2	M-W-F 10–12	2 "	32	..	..	?
3	M-W-F 1–3	2 "	31	1	..	?
4	T-T-S 8–10	3 "	9	1	2	33.3
5	T-T-S 10–12	3 "	20	1	..	5.0
6	M-W-F 3–5	3 "	34	9	12	61.7
7	M-W-F 10–12	3 "	33	14	8	66.6
8	M-W-F 1–3	3 "	23	2	3	21.7
	Totals		210	37	28	30.9

worked in the building; one a stenographer employed in a library on the second floor; one a stockroom attendant; one a student who paid social visits to a friend in one of the regular classes; and one a salesman who made but one visit to the building on December 13.

The history of this salesman is worthy of special comment. His date of onset was January 14, making an incubation period of 32 days. He went to bed January 19, and a definite diagnosis was made February 6. A blood culture taken February 6 showed *Brucella melitensis*. It was thus quite definitely established that the exposure of the patients took place about the middle of December.

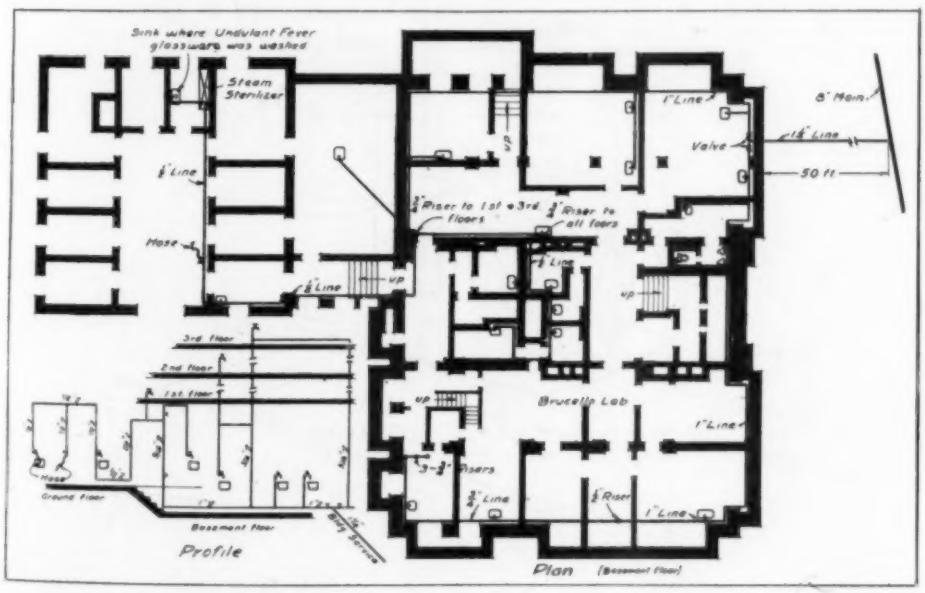
Every case found to be infected with Brucella melitensis had been in the bacteriology building during the month of December.

Complete histories were obtained on all clinical cases. None had had any contact with goats or goats' milk. There was no correlation in regard to living quarters, milk supply or other dairy products, restaurants, banquets or dinners. All evidence pointed to a source of infection which could only have been present in the bacteriology building and common to all who became infected.

Only a few of the patients had ever been in the brucella laboratory in the basement. There was no evidence that any of the cultures of brucella organisms from that laboratory had been taken to the laboratories used by the students. One possible medium which could have been a disseminator of the bacteria was water through the service within the bacteriology building.

The building is quite old and unsuitable architecturally for its purpose. Adaptation of the plumbing system to meet the demands of greatly augmented numbers of students during the past several years has greatly exceeded the capacity of the service. (See Figures II and III). It will be noted that the building's water supply is obtained from the college distributing system through a 1¼ inch service pipe approximately 50 feet long. Immediately

FIGURE II

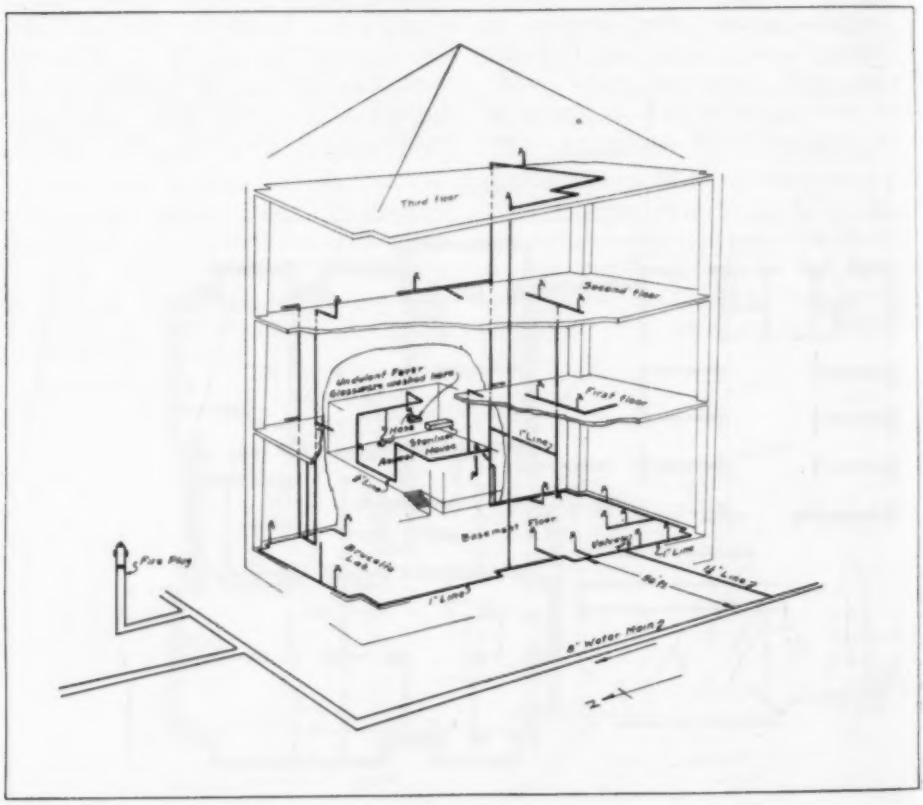


inside the building there is a T coupling diverting the water into two 1 inch lines which extend around the building in opposite directions but do not reconnect. One inch risers serve the first, second, and third floors.

It was a custom of the brucella laboratory to place discarded cultures contained in Petri dishes and culture tubes in copper containers of about 1 cubic foot capacity. These were packed full, a tight fitting cover adjusted, and placed in an Arnold sterilizer. At the end of 1 hour's exposure to steam the dishes were removed, media scraped out, and the glassware washed in a nearby sink. As a test of the effectiveness of this sterilization we carried out the following procedure: On removal of the copper container after 1 hour it was found that the glassware could be comfortably handled immediately and that the agar media was not even melted. It was obvious that the method was entirely inadequate for sterilization of cultures.

The custom followed in washing the glassware was as follows: After the media was discarded the glassware was put in a large dishpan in the sink, the dishpan filled with water, and after a period of soaking the glassware washed. A piece of rubber tubing connected to the faucet was used to prevent breakage. When the dishpan was filled this tubing extended below the surface of the water in the dishpan. The possibility of siphonage if a negative pressure obtained in the water system was apparent.

FIGURE III



DEMONSTRATION OF SIPHONAGE

By opening several faucets in the basement a negative pressure was produced in the faucet at the sink where the glassware was washed. A pressure recorder on the third floor showed a negative pressure equivalent to 2 inches of mercury when all outlets in the basement were allowed to remain open. A solution of fluorescine was placed in a container in the sink used for washing glassware and after a negative pressure was produced at that point the dyed water was siphoned into the water system. After the dye had reached beyond the riser pipes to the upper floors the pressure was again returned to positive, and green water was obtained from every outlet in the building.

Referring to Figure III it will be noted that one of the riser pipes supplying the third floor is connected with the line supplying the sink where the glassware was washed. This allowed for more direct water communication between this sink and the third floor laboratory. Considerably more pipes would need to be traversed by contaminated water to reach the first and second floors. This fact may have been responsible for the higher percentage of infected students among those using the third floor than among those using the second floor.

A new sink and 2 autoclaves were installed in the building during December. The water main outside the building had been tapped for a service to a new building nearby. Thus, in addition to the possibility of negative pressure being created by the simultaneous opening of a number of outlets in the building, there were additional possibilities when the water was shut off during these installations.

SUMMARY

1. An outbreak of 80 cases of infection with *Brucella melitensis*, with 1 death, occurring at Michigan State College, East Lansing, Mich., is reported.

2. All cases occurred in students and others using a bacteriology building which contains a laboratory that handled large numbers of brucella cultures.

3. A faulty technic of sterilization of discarded cultures was demonstrated.

4. Inadequate and faulty plumbing was found in which siphonage could be produced from the point where contaminated glassware was washed.

REFERENCE

1. Hardy, A. V., Frant, S., and Kroll, M. M. The Incubation Period in Undulant Fever. *Pub. Health Rep.*, May 20, 1938, pp. 796–803.

Vitamin D Potency of Human Breast Milk*

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FOR the prevention and cure of rickets in infants, human breast milk is admittedly superior to cow's milk. One would naturally assume this superiority to be based on a larger content of vitamin D in breast milk. Although quantitative data have not hitherto been available, there are three investigations which indicate how little vitamin D breast milk contains, for no evidence of healing in rachitic rats was observed after feeding the quantities of human milk shown in Table I.

Likewise, no evidence of healing was recorded after feeding the amounts of butter fat shown in Table II.

In competent bioassay laboratories it has been found that substantially 3 USP XI units of Reference Oil are usually required to induce a unit (2+ on the Bill's scale) of healing in rats

TABLE I

Breast Milk Fed Daily cc.	*Days*	*Total Fed* cc.	*Authors*
25	9	225	Hess, Weinstock and Sherman [1]
40 (condensed)	7	280	Outhouse, Macy and Brekke [2]
20	8	160	Bunker, Harris and Eustis [3]

TABLE II

Human Butter Fat Fed Daily *	*Total Fat Fed*	*Equivalent Amount* * *of Breast Milk*	*Authors*
0.2 cc.	1.6 cc.	50 gm.	Hess and Weinstock [4]
0.3 gm.	2.4 gm.	73 gm.	Lesne and Vagliani [5]
0.48 gm.	3.84 gm.	116 gm.	Palmer and Kennedy [6]
0.72 gm.	5.76 gm.	173 gm.	Sabri and Fikri [7]
0.36 gm. (Irrad.)	2.88 gm.	86 gm.	Sabri and Fikri [8]

* Assuming a consumption of 6.0 gm. of diet/rat/day, a feeding period of eight days, and a butter fat content of 3.3 per cent.

* Read by title before the Food and Nutrition Section of the American Public Health Association at the Sixty-seventh Annual Meeting in Kansas City, Mo., October 25, 1938.

Contribution No. 149 from the Biological Research Laboratories, Massachusetts Institute of Technology, Cambridge, Mass. This investigation was aided by a grant from the Permanent Science Fund, American Academy of Arts and Sciences.

TABLE III

Antirachitic Effect of Cream and Butter Fat Prepared from Human Breast Milk

Rat	*Supplement*	*Equivalent Volume of Breast Milk*	*Line Test (Bill's Scale)*
	gms.	*cc.*	
20030	10 cream	60	0.0
20031	10 "	60	0.0
20032	10 "	60	0.0
20033	10 "	60	0.5
20034	20 "	120	0.0
20035	20 "	120	2.5
20036	20 "	120	3.0
20037	20 "	120	1.5
20038	25 "	150	1.5
20039	35 "	210	2.0
20040	20 "	120	0.0
20041	25 "	150	0.0
20700	1.0 butter fat	30	0.0
20701	2.0 " "	60	0.0
20702	5.0 " "	150	0.0
20703	10.0 " "	300	3.0
20704	15.0 " "	450	1.5

made experimentally rachitic on the Steenbock 2965 ration. It appears, therefore, that since none of the above feedings of breast milk, or its fat, induced recognizable healing, there is evidence that mother's milk does not contain as much as 10 USP XI units of vitamin D per quart.

The investigation being reported was undertaken to determine the vitamin D potency of winter breast milk.

EXPERIMENTAL PROCEDURE

Sixty quarts of breast milk from wet nurses were obtained through the coöperation of the Boston Dispensary. Cream was obtained by passing this milk through a home-sized De Laval Cream Separator. Ten gm. of this cream, containing 20 per cent butter fat, produced no healing (Table III) when fed in the rachitogenic diet of each of 4 rachitic rats (20030–33) over a period of 6 days, while 20–35 gm. portions produced varying degrees of healing when fed 8 other rats (20034–41).

The remainder of the cream was extracted with four successive portions of anhydrous ethyl ether and the solvent was removed in vacuo under a stream of carbon dioxide. Graded portions of this ether-soluble fat were fed in the diets of each of 5 rachitic rats (20700–04) over a period of 6 days. The animals readily ingested quantities up to 10 gm., this latter amount producing definite rachitic healing (Table III). The animal fed a 15 gm. quantity showed rachitic healing but failed to gain in weight during the 12 days required for consumption of the supplement.

It is likely that the large feeding of fat prevented an accurate assay. Therefore, the remainder of the butter fat was saponified with 10 per cent aqueous potassium hydroxide and the ether-soluble fraction of the non-saponifiable material was fed in graded amounts to another series of 8 animals during a period of 6 days. One gm. of this material was equivalent to approximately 2,900 cc. of milk.

TABLE IV

Antirachitic Effect of Non-Saponifiable Fraction Prepared from Breast Milk Butter Fat

Rat	*Supplement*	*Equivalent Volume of Breast Milk*	*Line Test (Bill's Scale)*
	gm. non-sap.		
21126	.210	600	1.5
21127	.225	642	2.0
21128	.240	687	1.5
21129	.255	730	2.5
21340	.255	730	2.5
21341	.255	730	2.5
21342	.255	730	2.0
21343	.255	730	2.0

The results (Table IV) of the assays of this non-saponifiable material indicate that an equivalent of 730 cc. of human milk contain 3 USP XI units of vitamin D. The potency of the breast milk was therefore of the order of 4 USP XI units per quart.

DISCUSSION

The 15 gallons of breast milk used in these experiments, gathered during December, 1937, and January, 1938, constitute the largest, and therefore most representative, sample of human breast milk ever subjected to bioassay at one time. To conduct this assay it was necessary to prepare the non-saponifiable fraction of the milk fat since a rat will not consume enough breast milk or butter fat daily for a precise assay.

The results indicate that the milk from women in an urban community during the winter months contained not over 4 USP XI units per quart. It has been reported that cow's milk during the summer contains between 23 and 36 USP XI units per quart.

Whence, then, the greater power of breast milk, even in the winter, to protect the human infant against rickets more adequately than modified summer cow's milk? In the bottle feeding of the very young infant, cow's milk is customarily diluted with an equal volume of water. Such modified milk has a vitamin D content of at least 11 USP XI units per quart—nearly 3 times that of human breast milk. As the infant grows and formulae are changed, this disparity widens. The explanation lies elsewhere than in the vitamin D content.

Previously,[3] we reported that the milk from mothers fed metabolized milk contained an equivalent of 21 USP XI units per quart. On the basis of the present finding, it may be seen that the vitamin D content of breast milk can be increased at least five-fold.

CONCLUSIONS

1. A composite sample of 15 gallons of human milk contained only 4 USP XI units of vitamin D per quart.

2. The antirachitic superiority of human milk over cow's milk in infant feeding cannot be attributed solely to the quantity of vitamin D which it contains.

3. It is possible to increase the antirachitic potency of human milk at least five-fold by feeding metabolized milk to the lactating mother.

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Industrial Hygiene Codes*

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INDUSTRIAL hygiene codes in this discussion have to do with rules for the control of occupational disease exposure in industry.

All are familiar with the numerous safety codes prescribing rules and methods for the prevention of industrial accidents. Industry generally became safety minded years ago and set up rules and safe practices for the elimination of accidents, because the dangers of hazardous practices, devices, and operations were quite obvious to the average layman, and the effect of an accident was at once evident.

Unfortunately, it has only been in recent years that we began to realize that there were other occupational hazards considerably less obvious than accidents that should receive intelligent attention, particularly occupational diseases arising out of and in the course of employment. One only has to go back a few years and review the various state labor laws or industrial codes and note the very limited number of rules pertaining to health hazards, and even in these few cases the rules were largely limited to certain requirements for grinding and polishing operations.

Taking for example the few state requirements for safeguarding grinding and polishing operations, it was found that no two states agreed anywhere in reason on the air volume or air velocity required for exhaust equipment. The extremes varied from a maximum of 9,000′ per minute velocity in the branch pipe to a minimum of 2″ static suction as measured with a U-tube manometer gauge.

Within practically the past 6 years, we have become somewhat occupational disease conscious, brought about principally through the hysteria of the silicosis phase of the question. I say hysteria advisedly because it very nearly amounted to sabotage of certain industries from some sources, although it cannot be denied that hazards in many forms existed. At any rate it was obvious that we must know more about our problem and the measures necessary for the effective control of occupational diseases.

Some of the various branches of the industry, particularly the foundry industry, felt that the only way to obtain an intelligent understanding of their specific problems was to start an educational program and openly discuss the various phases of disease exposures in technical meetings and coöperate with various bodies attempting to suggest remedies to the industry. It was at once apparent that there was a great divergence of opinion as to the proper measures for control. The foundry

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industry therefore undertook the task of studying and setting up industrial hygiene codes applying to all phases of activity wherein there was an exposure to an occupational disease hazard. I suppose there is no industry that has so many ramifications and such a variety of operations wherein certain control measures may be required as the foundry industry and its allied departmental activities. A good start has been made in the developing of such codes and it is the purpose of those engaged in drafting the hygiene codes to continue their efforts until the whole industry has been covered.

In starting the task of formulating the codes, it was at once apparent that we lacked fundamental data for a great deal of our problem. True, we had the help and experience of the best informed industrial medical men, which was of value in pointing out the danger points to be safeguarded. With the knowledge gained from the industrial medical authorities as to what we should set up our codes for, we had our starting point.

The first thing we had to do was to develop a code prescribing a more accurate method of measuring and determining the flow of air in exhaust systems so that the vendor of equipment could intelligently meet the specifications and the plants had a prescribed method of knowing how to determine the functioning of the exhaust systems. Another code developed had to do with the fundamentals of design, construction, operation, and maintenance of exhaust systems. Surprising as it may seem, few people had any fundamental knowledge of design, and most systems were laid out by rule of thumb methods. Considerable research work was necessary, and we found out that the friction formulae for resistance of air flow in straight pipe that we had all been using were very much in error; also, the resistance losses in round elbows that had been accepted practice were at considerable variance with actual facts disclosed by research.

A code was developed applying to exhaust systems for grinding, polishing, and buffing equipment. This code attempts to put into orderly arrangement the various sizes of connecting branches with relation to wheel sizes, as well as specifying minimum air velocities.

Still another code has to do with the ventilation of the various types of tumbling mills. This was a difficult problem on account of the fact that the vendors had been building mills for years, and pattern equipment existed that could not be scrapped without imposing a severe price handicap to prospective purchasers of equipment.

Codes are under way for many additional types of equipment and processes in the industry.

In addition to equipment and process codes, there are codes being developed to control the specifications covering the toxic properties of certain commodities that are rather universally used in the industry, as well as prescribing safe methods for the use of such toxic materials.

In all of the code material providing for the suppression of dusts, gases, fumes, and vapors, the requirements are based on the best known engineering practice that exists at the present time. Dust counts are not recognized in any of the code material, for the reason that dust counts are still a very controversial subject and mean little or nothing to a great many plants that do not have highly trained experts familiar with dust count equipment and technic.

In the foundry industry, we believe that we have some definite facts about the development of industrial codes, and from these facts have adjusted the policy of our code committee activity. Some of these facts are:

1. One has to be occupational disease minded to comprehend the necessity for the development of industrial codes.
2. The people best qualified to develop a practical and intelligent industrial code are employers and users of equipment, because they understand all limiting factors of equipment and processes.
3. Vendors of equipment and processes should be party to the code development in order to give the advantage of their experience and that they may adjust their viewpoint to that of the user of the equipment to obtain maximum protection.
4. Make use of all pertinent information and personnel from recognized units, such as the U. S. Public Health Service, where there is a background of research and investigation of the phases of the problem under consideration.

The beneficial effects of having good industrial codes are manifold and some of the more important items are:

1. They provide the industry with the latest and best engineering data for the control of hazardous pieces of equipment, operations, or processes.
2. They put in the hands of the small employer who does not have an engineering staff, technical information for his use in order to specify types of equipment, exhaust systems, etc.
3. They put the vendors of equipment and systems on the same specification basis as to the requirements of the prospective purchaser.
4. Available good industrial codes make it possible for the legislative bodies to have up-to-date information available for their consideration and deliberation.
5. The proper observance of the requirements of industrial codes in controlling hazardous exposure will result in a large decrease in occupational diseases and compensation paid out.

With a good code that is observed, hardly any industry need pay out more than one cent for compensation per $100 of pay roll. The company I am associated with, we are proud to say, very early recognized its moral obligations with respect to hazards. For the year 1937 they paid out approximately ¼ mill per $100 of pay roll, and a good part of this money consisted of dermatitis claims.

One cannot be closely identified with the development of industrial hygiene codes without forming some very definite opinions as to what would constitute an ideal set-up for state industrial hygiene codes. When a state passes acts of legislation requiring certain minimum specifications and engineering details for the control of an occupational hazard, difficulties are at once encountered because there are always exceptions to the rule due to the tremendous variations of performing operations and in operating equipment. It is impossible to conceive or provide for all of these variations in a law. Hence a certain amount of confusion arises immediately. The same general argument holds good for state industrial codes which have the force and effect of law, although it is usually easier to modify industrial codes by means of public hearings than it is to get a legislature to make changes. A better method is to have an enabling act of legislature providing for a state supervising or enforcing agency that shall be charged with the duties of formulating rules and regulations for the protection of the health of workers and also for the enforcement of such requirements. The rules and regulations so formulated should be of a general requirement character only and not specific as to physical dimensions and engineering details.

One of the principal requirements of the general code shall be that of the supervising department having the power to adopt and apply reasonable and up-to-date physical engineering details and data more or less in the form of an appendix to the general code, but definitely not a part of the code, so that it will not have the force and effect of law. This plan makes it possible for the supervising department to have some discretionary power to meet the unusual situation as it arises, and further permits changing the en-

gineering requirements as better information and knowledge become available on the subject. This method outlined would permit the supervising agency to keep abreast of the times, and would eliminate numerous handicaps and confusion.

It is our definite recommendation based on the experience we have had in the foundry industry, that every industry should develop a code for the control of occupational disease hazards. Having developed such a code they should make every attempt to get that industry to apply the code to its hazardous operations. This will aid materially in bettering the working conditions by promoting good housekeeping, it will prevent disability through removal of hazardous exposures and result in operating economies through lowered compensation paid for occupational disability and through improved working methods of operation.

DISCUSSION

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Mr. Allan is to be commended on his paper and on the concise manner in which his topic has been handled. The subject is a large one and extremely difficult to handle in a short presentation.

I am quite familiar with the particular foundry code which has already been developed by a capable committee headed by Mr. Allan as chairman. While this code is not entirely in agreement with our own Wisconsin requirements, particularly as to air velocities, I feel that it is an excellent treatise and can well be invaluable to the foundry industry. It may also serve as a guide to other industries in preparation of similar codes for their own purposes. This code places in the hands of the foundryman complete information relative to the removal of hazardous dusts, fumes, vapors and gases and gives all of the information necessary for a complete design from the isolation at the source of the hazard to the final collection or method of disposal.

This code, which really can be classed as a textbook, is of necessity entirely different from the type of codes or rules which should be prepared by governing bodies, such as state organizations. These codes should not in any sense be of the textbook form, but should be so designed as to act merely as a guide to the competent designer or engineer who has both the experience and other necessary design data on hand for his design. These codes need only set up detailed standards as to general requirements and as to the results to be accomplished.

Mr. Allan points out the difficulties which are encountered when a state legislature passes laws requiring certain minimum specifications and engineering details for the control of occupational hazards within its respective state. He is entirely correct in his viewpoint, as such a procedure sets up a legal requirement which cannot be changed except by legislative repeal or amendment. It is far better to have an enabling act passed which designates to some proper and competent administrative body the power to draw up and set forth the rules or orders which may be necessary to provide proper working conditions.

Such a situation exists in Wisconsin,

where the legislature about 27 years ago created the Industrial Commission and, among other duties, empowered this commission to prescribe, modify, and enforce orders for the protection of life, health, safety, and welfare of employees and frequenters of public buildings and places of employment within the state.

Among the publications which have been issued covering various phases of safety and sanitation is the industrial hygiene code entitled "General Orders on Dusts, Fumes, Vapors and Gases." This code contains general fundamental requirements for protection, setting up necessary face velocities and also the required minimum velocities through the branch ducts which are based on U-tube suction readings. Such a method, rather than the pitot tube method was deemed necessary due to the fact that check-ups of exhaust systems are made by the general field deputies of the commission, and it would be impractical to equip them with any more elaborate equipment for this purpose than a U-tube. Our code further specifies the minimum gauges of metal to be used, indicates the minimum sizes of main ducts in proportion to the entering branches, provides for the maximum angle of entrance for branch ducts, makes provision for proper disposal of the entrained material, and in general is so set up as to be a guide to the engineer or manufacturer in the design of his exhaust system.

These orders, however, are flexible in that they can be modified without legislative action in special cases. We have found, during the more than 6 years that this code has been in effect, that the requirements which have been set up are proving quite satisfactory for the general run of manufacturing plants. Occasionally, however, a situation arises in connection with certain processes where modification is necessary, and in such cases this modification is granted. There are also other situations where careful engineering design is provided and where exceptional maintenance and supervision of the equipment is furnished which may also permit reduction in air volumes and velocities. Such a modification was granted to Mr. Allan's company for its Milwaukee plant and was definitely based on its engineering design and the particular maintenance and supervision which is provided at all times.

It has not been my intention to advertise Wisconsin's code, but merely to point out that individual state codes can be provided which are sufficiently flexible to take advantage of good design and to progress as better information and increased knowledge become available on the subject. I believe that this coincides quite well with the ideas expressed by Mr. Allan.

Vital Statistics of the Pueblo Indians*

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THIS paper deals with the demographic facts available for one group of North American Indians, the Pueblos of New Mexico. These Indians constitute a population of about 12,000 living on 19 reservations along a 300 mile line from Taos in the north to Zuni on the western border. For centuries they have existed in small compact communities, cultivating the fertile strip along the banks of the Rio Grande and other rivers. Because of their settled agricultural and communal life their customs and habits are more highly stabilized than those of other Indians. Comparatively little migration has taken place between the Pueblos and other racial groups. They have maintained themselves as tightly bound, largely self-governing groups, and while it is impossible to claim for them absolute purity of blood the findings of the United States Census for 1930 show that the two linguistic stocks with which we shall deal, the Keresan and Tanoan, assert themselves to be 98 and 95 per cent respectively, "full blood."

THE RECORDS

Since the Spanish conquest the Pueblos have been under the religious direction of the Roman Catholic church and the records of baptisms and burials are preserved in their parishes. During this period censuses varying in completeness were made at irregular intervals. Following the American occupation of New Mexico and the subsequent appointment of an Indian Agent in 1849, official population counts were made occasionally until about 1900, estimates being submitted to Washington in the intervening years. Between 1900 and 1910 a more thorough system of recording pueblo membership was introduced. This took the form of a census roll for each pueblo, giving the details of name, age, sex, family connection and degree of blood for each member of the pueblo. These were revised from year to year by field employees of the Indian Service who necessarily used the records in their daily work and

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had the opportunity to consult with the Indians as to their accuracy. The revisions consisted of additions to the pueblo by birth and immigration and removals through death and emigration.

The rolls, although revised annually, had never been corrected by means of an actual enumeration until 1936 when a canvass was made for this purpose by Indian Service and Soil Conservation Service employees. In addition the records were submitted to the governor and council of each pueblo for further verification and for certification as to their accuracy. The fact that these census rolls, which are believed to be as accurate as it is possible to make them, differed in no important respect from the earlier ones, supports our assumption that the old rolls were substantially correct except possibly for the statements as to degree of blood.

Supplementary to the revisions of the census rolls, the standard birth and death certificates of the U. S. Bureau of the Census have gradually come into use. While they are signed by physicians for the relatively few hospital deaths, the field nurse is responsible for the greater number. Therefore certification can be considered correct only as to the event of death and not as to cause.

In conjunction with the recently revised census roll a new system of collection has come into effect. Native enumerators have been appointed for each pueblo who receive a suitable fee for every report of a birth, death, marriage, divorce, or change in membership. Monthly reports are sent to the main office of the United Pueblos Agency together with birth and death certificates for which the nurse is still responsible. Upon receipt at the main office, the monthly data are incorporated into what is essentially a population register. A master card for each member of every pueblo has been prepared and placed on file which contains all the information given on the 1936 census roll, *i.e.*, name, parentage, relation to household head, address, sex, date of birth, legitimacy, blood, and tribe, with provision for changes in such items as address and relation to household head. In addition, space is allowed for a full record of the events of marriage, childbirth, and death as they occur. When this system has been perfected its supervision by one clerk will permit of a complete and continuous check on the approximately 12,000 Indian inhabitants of the pueblos.

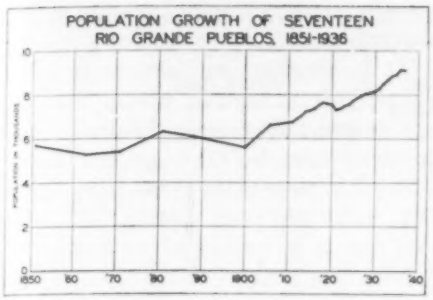
The demographic aspects presented here relate to 17 of the 19 pueblos, for which practically complete censuses exist. The data for Santo Domingo and Zuni have been excluded, the first because of native resistance to outside interference and the second because of similar difficulties as well as the relative dispersion of its population. The 17 pueblos contained altogether 9,104 persons in 1936. They range in size from Laguna, with 2,367, to the practically extinct Pojoaque, with 20 persons. As we cannot establish accuracy for natality and mortality reporting prior to 1926, mortality and natality rates have been computed for an 11 year period only, 1926–1936, inclusive. The population data have been taken from the census rolls, and those for natality and mortality from the rolls as well as from the existing birth and death certificates. Assistance in certain phases of the tabulation was secured from the Carnegie Institution of Washington.

POPULATION GROWTH

Chart 1 gives the population curve of the 17 pueblos during the period of American control. Only those population figures are shown for the period before 1911 upon which some degree of reliance can be placed.

The pueblos, previous to 1900, contained between 5,000 and 7,000 persons.

CHART 1



Since then a gradual increase has taken place checked only by the influenza epidemic of 1918–1919. This upward trend cannot be entirely accounted for by the improvements in enumeration and is due to an actual population growth. Recent newspaper publicity on the growth of the Indian population of the United States since 1900 gives tardy recognition to this trend, true not only of the Pueblos, but also of other Indian tribes.

POPULATION DISTRIBUTION BY AGE AND SEX

The 1936 age-sex diagram of the population of the 17 pueblos, together with those of whites and negroes for the United States in 1930, is shown in Chart 2. The Pueblo diagram demonstrates a high proportion of children in the population, and a smaller percentage of females over 35 years of age as compared with males. In the latter respect the Pueblo Indians are similar to the Negroes.

TRENDS OF NATIVITY AND MORTALITY

The trend of the birth rate, death rate, infant mortality rate, death rates of persons under and over 5 years of age, and the vital index are shown in Chart 3 and Table I for the years 1926–1936, inclusive. For this period the average annual death rate was 20.9 per 1,000 population, the birth rate, 38.0 per 1,000 population, and the infant mortality rate, 171.2 per 1,000 live births. The vital index was 185. The infant mortality rate, which appears to be slightly increasing, is the only annual series showing a trend. The increase, however, is not statistically significant, and we are inclined to attribute it to an improvement in recording infant deaths. In the earlier years when death certificates were not available, our use of the census rolls to determine the number of deaths would not reveal deaths which occurred before names could be entered. In a careful study of infant mortality in the

CHART 2

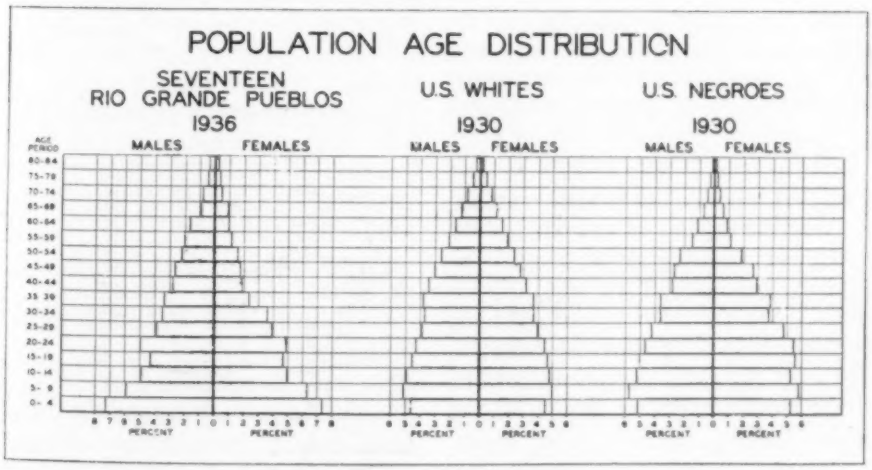


TABLE I

Annual Birth and Death Rates and the Vital Index for the Indians of Seventeen Rio Grande Pueblos, 1926–1936

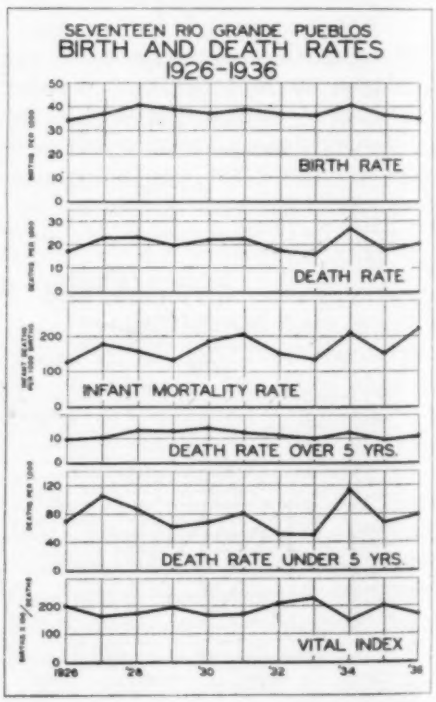
Year	Birth Rate *	Death Rate *	Infant Mortality Rate †	Death Rate		Vital Index ‡
				Under 5 Yrs.*	Over 5 Yrs.*	
1926	34	17	126	70	10	201
1927	37	23	177	106	10	163
1928	41	23	159	87	14	175
1929	39	20	133	62	13	196
1930	37	22	186	68	15	168
1931	39	23	206	81	13	172
1932	37	18	152	52	12	211
1933	37	16	135	50	10	229
1934	41	27	213	115	13	150
1935	36	18	152	69	10	203
1936	35	20	224	80	11	171
Annual Average	38	22	171	76	12	185

* per 1,000 population
† per 1,000 live births
‡ (births x 100)/deaths

pueblos of San Juan and Santa Clara for the years 1925 to 1930, Aberle found the infant mortality rate to be above 200.

The difference between the birth and death rates, amounting on the average to an annual increase of 17.1 persons per 1,000 population, is sufficient to account for the change in population numbers since 1926, and can be presumed to be responsible for the increase between 1900 and 1926. But in the absence of natality and mortality data covering this latter period and due to the fact that it is improbable that the birth rate has increased substantially, we are led to regard a significant lowering of mortality during the period 1900 to 1910 as the factor leading to the increase in population. The explanation, we believe, lies in the change in the number and degree of severity of epidemics experienced by the Pueblo Indians. Quantitative information on this point is lacking, but the belief is borne out by early historical records and the annual narrative reports of the Pueblo Indian Agents. The latter, published in the *Annual Reports of the U. S. Indian Service* up to 1906, and to be found in the government archives for subsequent years, comment upon the health of the pueblos. The occur-

CHART 3



rence of an epidemic was usually noted, with mention of the type of the disease and the pueblos in which it occurred.

The great smallpox epidemic of 1781 is classic in the history of the Southwest. Bancroft records that among the Pueblo Indians 5,000 deaths occurred in that year out of an enumerated 9,000 in 1760. Bloom has translated the accounts of the introduction of vaccination in New Mexico in 1804 and relates that in 1805 a count of those not having had smallpox showed that in the pueblos and Spanish settlements of central New Mexico over two-thirds of the children under 12 had had the disease. The report did not record numbers for men and women because, the alcalde states, ". . . in all this jurisdiction no one has been found who is more than 6 years of age who has not suffered from the sickness of smallpox." The subsequent wide-scale program of vaccination was not maintained, however, for between 1837 and 1840 a combined siege of smallpox and typhoid is recorded as having killed one-tenth of the inhabitants. As late as 1889 the Indian Agent reports: "At a few of the pueblos there has been a great deal of sickness during the past year . . . and it is estimated that about 400 have died during the past year at said pueblos, smallpox and diphtheria being the principal diseases." In the two following years these diseases spread to other pueblos, causing further fatalities. In 1894 and 1895 spinal meningitis or spotted fever caused a considerable number of deaths in two of the pueblos.

During the next decade, however, the story changes. In 1903–1905 diphtheria appeared again but the introduction of antitoxin was successful in checking mortality from the disease. During the latter half of the decade no record of serious epidemics has been found. Vaccination of the pueblo school population was reported to have been carried out in 1896, but in 1913–1914 a complete vaccination of the pueblo population was ordered. Shortly after, smallpox broke out among the Navajos to the west and subsequently spread over New Mexico into the Spanish population in the region of the pueblos but not to the vaccinated Pueblo Indian population. Since 1900 only one epidemic of a size markedly affecting the population curve has occurred, the influenza epidemic of 1918–1919. As to other epidemics we find record, for example, that measles and diphtheria caused the deaths of approximately 100 children in the pueblo of Santo Domingo in 1915. Other notes regarding the appearance of diphtheria, measles, scarlet fever, whooping cough, and influenza appear in the narrative reports, but now the epidemics are measured in numbers of cases rather than deaths, and frequent comments on the mildness of the diseases are found. Trachoma and tuberculosis have long been of serious concern among the pueblos. But the great epidemics of the 18th and 19th centuries no longer appear, thus making it possible for the disparity between the birth and death rates to manifest itself in population increase.

The decline in epidemic effects on mortality may be attributed to the following factors:

1. The establishment of day and boarding schools between 1870 and 1890 which brought the children of the pueblos under supervision.

2. The appointment of field matrons during 1880–1890 who, acting as instructors in housekeeping, brought new ideas of cleanliness.

3. The beginning about 1900 of the appointment of contract and staff physicians.

4. The practically complete vaccination of the pueblo population in 1913 and 1914, and the introduction of the use of diphtheria antitoxin.

5. The introduction of driven wells in the pueblos. In 1914 the first 3 of the pueblos were supplied with driven wells. These were of the approved type with tight casings and concrete caps and, by freeing the inhabitants from the necessity of using water from the

irrigation ditches for drinking purposes, were presumably effective in cutting down typhoid and dysentery.

With these 5 factors, all of which act, by human effort, directly against the effect of infectious disease, we must also include the change in character of smallpox and scarlet fever from severe to relatively mild forms, a phenomenon well known in the United States. Also the possibility exists that by the stringent forces of selection some degree of immunity to the diseases of the white man may have come to the Indian.

MORTALITY BY AGE AND SEX

The variation in mortality by sex and broad age groups for the 11 year period is shown by the rates (per 1,000 population) of Table II. Similar rates for the white and colored population of the U. S. Death Registration Area of 1930 are also given.

TABLE II

Mortality Rates by Broad Age Groups, Seventeen Rio Grande Pueblos, 1926–1936, Compared with Whites and Colored, U. S. Death Registration Area, 1930

	Males			*Females*		
		U. S. Death Registration Area			*U. S. Death Registration Area*	
	Pueblos	*Whites*	*Colored*	*Pueblos*	*Whites*	*Colored*
Under 5	98	18	33	76	14	27
5–14	4	2	3	6	1	3
15–24	5	3	8	9	3	8
25–44	7	5	15	11	4	13
45–64	16	18	31	19	14	31
65 and over	65	78	89	55	71	80
Total	21	12	18	21	10	15

Rates per 1,000 population

Comparing the rates for Pueblo Indian males with those for females we find that mortality among the males is considerably higher at ages under 5 and over 65 than among females. The higher death rate under 5 for males is also observed for whites and negroes, but for the Pueblos the male rate, relative to the female, is 28 per cent higher as compared to 25 and 22 per cent for the whites and negroes respectively. The females exceed in mortality during the period of middle life. Aberle has previously shown that maternal mortality is high among Pueblo women and although we have no data on causes of death it appears that this factor, together with tuberculosis, may account for the excessive female mortality between 15 and 45 years of age.

In contrast with the whites and negroes, Pueblo mortality by sex shows for the Pueblo population a greatly excessive mortality at the younger ages, an excess which gradually diminishes with advancing age until, in the age group 25–44.9, the Pueblo rates lie between those for whites and negroes, and at the oldest age group, 65 years and over, Pueblo mortality is less than for either whites or negroes. The latter difference is statistically significant between Pueblos and negroes but not between Pueblos and whites. A check on the accuracy of age-statements of Pueblo Indians over 40 does not indicate that over-estimation of age can account for the low mortality at these older ages. For an explanation of this

TABLE III

Average Annual Birth, Death and Infant Mortality Rates, Seventeen Rio Grande Pueblos, 1926–1936

Pueblo	*Population Average 1930–1932*	*Birth Rate*	*Death Rate*	*Infant Mortality Rate*
Acoma	1,044	38	16	142
Cochiti	286	48	28	166
Isleta	1,057	35	19	126
Jemez	637	45	32	221
Laguna	2,143	31	15	165
Nambe	128	39	15	55
Picuris	113	42	28	190
Pojoaque	20 *	32	27	286
Sandia	114	42	30	114
San Felipe	539	52	38	274
San Ildefonso	111	49	29	250
San Juan	515	40	21	170
Santa Ana	235	37	21	94
Santa Clara	376	41	23	213
Sia	178	49	23	197
Taos	706	33	16	130
Tesuque	119	53	31	174
Total	8,321	38	21	171

* Estimated
Birth and death rates per 1,000 population; infant mortality rates per 1,000 live births

indicated low old-age mortality, we are inclined to fall back upon the well worn explanation of the "stress and strain of modern life" as the factor producing higher mortality among whites and negroes. Not sharing the oil royalties of his Oklahoma brothers, without automobiles, and deprived by law of the use of intoxicating beverages, the Pueblo Indian can be said to lead a comparatively uncomplicated life.

MORTALITY AMONG INDIVIDUAL PUEBLOS

When the 11 year mortality data are subdivided by individual pueblos, chance fluctuation appears to confuse the picture (Table III). It may be said, however, that generally mortality rates significantly lower than for the pueblo group as a whole are found in those pueblos in which cash income is greatest, such as Acoma and Laguna, which receive employment from the railroad, and in Taos, the New Mexico tourist mecca and artist colony. On the other hand, high rates appear roughly to be associated with pueblos with a minimum of cash income, such as in Cochiti, Jemez, Sandia, San Felipe, and Tesuque. The infant mortality rates of the pueblos of course vary widely, but it is interesting to note that a significantly low infant mortality rate (126) is recorded for Isleta, the pueblo only 12 miles from the medical and hospital facilities of Albuquerque, and in which an efficient and energetic public health nurse has functioned during the years for which we have data.

SUMMARY

Among races of record, the Pueblo Indian is almost unique in the United States in showing a high birth rate and death rate, neither of which has declined since 1926. The vital index appears to have exceeded and maintained a level over 100 since about 1900, which

has come about by the lessening of the amount of and the effect of infectious disease. However, the high mortality rate, especially at the younger ages, presents a challenge to continued and increased effort on the part of the sanitarians and members of the medical profession interested in the health of the Indian. We cannot consider here the many factors which, once controlled or improved, will yield beneficial results. Diet, further sanitary improvements, the betterment of the economic condition of the Indian, and an increase in medical facilities may be cited. Attention is already being turned to factors such as these and if such efforts as are being made are continued without financial or political restriction we may expect to see results in a downward trend of mortality among the Pueblo Indians.

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Newer Research Findings for Dealing with Syphilis and Gonorrhea*

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IN the time at my disposal for the preparation and presentation of this paper, it is not possible for me to give a full digest of the advances made in the last few years in the scientific bases for the control of syphilis, gonorrhea, and other so-called venereal diseases. Important and impressive reports have appeared regularly in the literature and are available to all who wish to go exhaustively into these subjects. I would especially call attention to Padget and Moore's "Syphilis, A Review of Recent Literature," published annually.[1] It is well worth the time of any physician interested in this subject to study Moore's articles.

In 1936 there appeared an excellent report on our knowledge of the gonococcus and gonococcal infections written by Thomas and Bayne-Jones,[2] the result of 2 years' work by a joint committee of the National Research Council and the American Social Hygiene Association. This report has recently been brought up to date by Dr. Thomas in a project sponsored by the American Neisserian Medical Society and the U. S. Public Health Service. Numerous articles on "Lymphogranuloma Inguinale" have appeared but, so far as I know, there has been no comprehensive summary, though interest has been keen and research active during the last 3 years; nor has there been any comprehensive survey of our medical knowledge of chancroid or granuloma inguinale.†

Since time limitations oblige me to choose a few items for emphasis in this presentation of scientific advances, I will briefly discuss what seems to me the most interesting and possibly the most important forward steps.

It is well that the most spectacular discoveries of the last few years have been in the treatment of the most neglected communicable disease afflicting mankind, the "step-child of medicine," the disease known by a

* Read before the Public Health Education Section of the American Public Health Association at the Sixty-seventh Annual Meeting in Kansas City, Mo., October 26, 1938.

† Reference should be made, for the sake of completeness, to several important reports on the public health aspects of syphilis and gonorrhea. The report of the 1936 Conference on Venereal Disease Control, published by the U. S. Public Health Service, constitutes an excellent presentation of principles and methods of control of syphilis and gonorrhea. Clarke's report of the New York City Commission to Study the Control of Syphilis and Gonorrhea in Scandinavian Countries and Great Britain,[3] and Harrison's report [4] covering the same ground, and in addition Holland, give the facts regarding European progress. "Next Steps in Gonorrhea Control," in the July, 1938, issue of *Venereal Disease Information*, gives the latest ideas regarding the subject indicated. The May-June, 1938, issue of the *Journal of Social Hygiene* describes the status of social hygiene programs and activities, including syphilis and gonorrhea control in official and voluntary agencies throughout the United States.

dozen humorous nicknames, the infection that causes sterility, arthritis, blindness, and chronic invalidism, the most prevalent ailment excepting only the common cold—of course, I mean gonorrhea and other gonococcus infections. Recent discoveries have changed the outlook on the conquest of this ubiquitous disease. We need no longer fumble aimlessly with the colossal problem of gonorrhea.

Three highly important discoveries in the therapy of gonococcus infections have made this difference in the outlook. They are: the estrogenic hormone treatment of gonococcal vaginitis, discovered by Dr. Robert Lewis, of Yale; the fever treatment of gonorrhea to which many experimenters have contributed, including Kumer, Carpenter, Warren, Simpson, and Bierman; and most spectacular of all—sulphanilamide —with contributions by Foerster, Long, Bliss, Mahoney, Van Slyke, Thayer, Cohn, and others too numerous to mention here. All of these methods are still in the experimental stage but each has definitely proved its value under certain conditions.

All types of gonococcus infections were curable in most cases by the older methods, but treatment was tedious and often uncertain of results. Since gonorrhea is potentially infectious until cured, methods which give quicker results were desirable, both from the standpoint of cure and of prevention of spread of infection. The lack of such speedy methods of rendering gonorrhea non-infectious was one of the causes of apathy of health officers with regard to gonorrhea. The problem seemed both stupendous and hopeless to many. The vital thing in recent progress is that the newer methods of treatment shorten the time required for satisfactory results; that is, cure of the disease and cessation of spread of infection. The newer methods also give satisfactory results in a larger percentage of cases treated.

Robert Lewis observed, as have many others, that girls having gonococcal vaginitis apparently "outgrew" their infection when they had passed through the anatomical and physiological changes collectively called puberty. The vaginal mucosa during puberty becomes thicker, tougher, and more resistant to infection. Lewis considered that if he could induce these changes in little girls having vaginitis, perhaps the infection would be cured. He found that estrogenic substances produced the desired change in vaginal epithelium first in experimental animals and then in girls; and that, as he anticipated, on discontinuing the use of the substance the vaginal mucosa returned to its normal infantile type with no deleterious residual effects and the gonococcal infection disappeared. It was later shown that probably not only the change in epithelium itself but the concomitant change in the pH of the vaginal secretion from the neutral or alkaline side to the acid side, brought about the cure of vaginitis. The estrogenic substance is now generally administered as a vaginal suppository.[5] The treatment which seems most convenient and popular is a capsule or half a suppository containing the equivalent of 1,000 international estrogenic units inserted into the vagina daily at bedtime. This treatment is safe, has no deleterious effects, cures about 63 per cent of cases,[6] is convenient for home treatment and saves the child from long periods of hospitalization. It constitutes an important advance in therapy, beneficial to the mental and physical welfare of thousands of infected little girls.

"Fever treatment" of gonorrhea is not new. The American Indians used the sweat house for the treatment of gonorrhea probably from the time they acquired this disease from the white man. Wagner Jauregg, in his early ex-

periments, noted that fever benefitted gonococcal urethritis as well as dementia-paralytica in his patients. Kumer,[7] at Innsbruck, for more than 18 years has been treating stubborn cases of gonorrhea by means of malaria and has been obtaining excellent results, especially in women.

Many different means of producing fever temperatures for the treatment of gonorrhea have been used but they can be divided into the two groups of which typical examples are mentioned above; namely, physical means like the Indian sweat house, and physiological means like Wagner Jauregg's malaria. I once asked Wagner Jauregg what was his preference among the various methods of producing fever temperatures for the treatment of gonorrhea and syphilis. He replied, "Any kind of fever is good for these diseases, but all are not equally good for the patient nor equally convenient, controllable and safe." Unless methods have changed since I last studied this subject in Europe in 1935, malaria is still the method of choice where fever is used for the treatment of either syphilis or gonorrhea. In the United States, however, more attention has been given to physical means of elevating temperature. Among the most popular today are: (1) the Kittering hypertherm using hot moist air (just as the Indians do in their sweat houses); (2) radiant heat as employed in the cabinet devised by Carpenter and Warren; and (3) high-frequency shortwaves, and a combination of high frequency and diatherm as employed by Bierman.

The work of Carpenter and Warren [8] is among the most outstanding in the use of artificially induced fever in the treatment of gonorrhea, because of the scientific method employed. They first isolate the strain or strains of gonococcus infecting the patient; they next determine the thermal death time of the particular strain at a temperature of 106.7° F.; they then place the patient in the cabinet, and under the most painstaking medical and nursing supervision they raise the patient's temperature to 106.7° and maintain it at this level for the indicated period of time; or, if this is found to be dangerous, for a somewhat shorter period of time. The great majority of patients (87 per cent) were cured, as determined by most careful clinical and bacteriological studies, after one treatment of 6 to 27 hours' duration.[9]

Other methods of fever treatment of gonorrhea are not so elaborate nor so scientific. They apply heat in one or more sessions in the fever cabinet for fixed periods of time and at fixed temperatures. It is significant, however, that all types of artificial fever treatment give good results in gonococcus infections.

What is the mechanism of cure of gonorrhea by active or passive fever temperatures? It may be that the temperatures attained kill the gonococcus. In the method used by Carpenter and Warren, the gonococcus may be literally "parboiled." It may be that fever stimulates the defense mechanism of the body or injures the gonococcus so that the defense mechanism can more effectively attack the invader. This is probably true of malaria treatment where very high temperatures are not attained but where results are excellent. The mechanism of cure may be some combination of these factors, or some other factor as yet unrecognized.

However fever therapy acts in the treatment of gonorrhea, it is a valuable addition to our armamentarium and has, I believe, come for a long stay, because: (1) It cures, even in one day, in many cases, where the Carpenter and Warren method is used; (2) it cures highly recalcitrant complications in many instances; and (3) used in conjunction with other treatment, it cures even a larger percentage of stubborn

cases. The disadvantages of the fever treatment are: (1) It is not without danger; (2) it is a very mean experience for the patient; (3) it requires hospitalization and highly specialized medical and nursing care; (4) and consequently, it is expensive but not relatively so when one considers the costs of surgical intervention in many complications.

Sulphanilamide is the name given by the Council on Pharmacy and Chemistry of the American Medical Association to "para-amino-benzene-sulphonamide" or "para-amino-phenyl-sulphonamide." Foerster, on May 17, 1933, made the first report of medical use of sulphanilamide when he presented to the Dermatological Society of Dusseldorf, Germany, the remarkable therapeutic results obtained by the administration of this drug in a case of generalized staphylococcal infection. Subsequently, sulphanilamide was tried by many others in Germany, France, Great Britain, and the United States, with continuously heightening interest on the part of the medical profession.

The therapeutic value of sulphanilamide may possibly prove, when at last its value is established, to be comparable with that of salvarsan, quinine, or other previously known specifics. The drug is given by mouth and by hypodermoclysis and sometimes intrathecally. Its mode of action is not understood but the suggestion has been advanced that sulphanilamide may dissolve the capsules of various cocci or in some way make them more vulnerable to bactericidal substances present in the serum.[10, 11]

Apparently, sulphanilamide has specific value in the treatment of many coccal infections in humans. Not only the staphylococcus, streptococcus, meningococcus, and the pneumococcus, but also the gonococcus appear to be susceptible to the attack of this drug. Its scientific use in the treatment of gonococcal infections has not passed the experimental stage, though thousands of doses are sold daily over drug store counters without physicians' prescriptions. So far as serious studies have progressed, they indicate that sulphanilamide is a potent but, in the doses necessary for therapeutic results, a somewhat dangerous remedy for gonorrhea.

Cases of gonorrhea treated as bed patients under careful medical supervision require large doses of sulphanilamide given at frequent intervals throughout the 24 hour day for several days in order to obtain satisfactory results. Apparently about 84 per cent of cases thus treated have been cured, but too few cases have been followed for adequate periods to permit definite statements as to the percentage of ultimate cures. Of acute cases, 76 per cent were apparently cured and of chronic cases, 97 per cent were apparently cured by sulphanilamide therapy. Results in outpatient services have thus far been less satisfactory. About 55 per cent of ambulatory patients were apparently cured on the basis of clinical and bacteriological findings, in a group studied at the New York City Department of Health.

The reasons for the substantially better results in bed treatment as compared with ambulatory treatment seem to include the following: (1) bed rest is beneficial in any treatment of acute gonorrhea; (2) the control of the intake of fluids is difficult in ambulatory patients; (3) the ambulatory patient may not take his medicine regularly and in the proper doses.

At the best, taking all cases as they come, some 15 or 20 per cent do not respond to treatment, but an analysis of cases indicates that chronic cases do much better with sulphanilamide than acute cases. This may be because sulphanilamide supplements and aids the body's own defense mechanism and

gives the best results if administered after the defense mechanism has already swung into action.

In order to obtain satisfactory results in the treatment of gonorrhea, large doses of sulphanilamide must be given. Mahoney, Van Slyke, and others [12] gave nearly 8 grams of sulphanilamide per day for several days and then reduced the dose, in any case giving the drug at 4 hourly intervals. Somewhat smaller doses are given to ambulatory patients. In both types of cases water is limited to 1 or 1½ liters per day. It has been observed that if improvement does not occur in the first 5 days of treatment, the chances of subsequent satisfactory results by this method are poor and the treatment with sulphanilamide may as well be discontinued.

Not only gonorrhea in the adult but vaginitis in little girls is apparently cured by sulphanilamide. The results of sulphanilamide treatment of gonococcal vaginitis are believed to be about the same as those obtained by the use of estrogenic substances. Gonococcal infections of the eye also appear to do well with sulphanilamide administered as systemic treatment in addition to the standard local treatment.

The therapeutic dose and the toxic dose of sulphanilamide are perilously near to each other. And the toxic manifestations of the drug are numerous and sometimes serious. Among the gravest is acute hemolytic anemia. Common manifestations of intoxication, one or more of which are observed in many thoroughly treated cases, include photosensitive eruptions resembling the measles rash, cyanosis, acidosis, dizziness, headaches, shortness of breath, diarrhea, general depression, and ringing in the ears.

Some of these toxic manifestations can safely be ignored, others can be successfully combated by the physician, but some demand instant withdrawal of the drug. The precautions which should be taken in order to attain the full therapeutic effect of sulphanilamide and at the same time avoid serious complications include, in addition to daily clinical supervision, frequent estimation of the concentration of sulphanilamide in the blood, hemoglobin estimation, and cell count including a differential count of the white cells. Thus sulphanilamide can only be administered safely by a physician with the assistance of a competent laboratory, preferably with the patient in a hospital.

Recently, the press of the whole country has carried stories of deaths attributed to the administration of a preparation called "Elixir of Sulphanilamide." At this writing 69 deaths have been traced to this preparation. It is believed that not the sulphanilamide itself but an adjuvant called "diethylene glycol" which was used in this mixture was responsible for these fatalities, but this experience emphasizes the great danger that may accompany the use or prescription of untried and unapproved preparations. The Board of Health of New York City has forbidden the sale of sulphanilamide except on the prescription of a licensed physician.

While nothing in the long and gloomy history of gonorrhea has aroused hope of its eventual conquest like the discovery of sulphanilamide in its treatment, there are, let us not forget, many difficulties. Sulphanilamide sometimes causes symptoms to disappear while the patient still remains infectious with gonococci in the prostatic and other secretions. Haphazard, unscientific treatment methods will doubtless lead to many still infectious cases being turned loose to spread the disease, just as in the past. Again, we are faced with the difficulty that though best results are obtained by bed treatment, beds are, in fact, available for only a small fraction of existing cases. These do

not seem to be insuperable obstacles. Better trained, more conscientious physicians can overcome the first difficulty, and education and a reasonable hope of success can lead taxpayers to provide the necessary beds. Also the comprehensive experimental work now in progress may develop better methods for ambulatory treatment.

Where, then, do we stand today with regard to gonorrhea? We have three new methods of treatment of gonococcus infections. Each of these forms of treatment apparently gives quicker and better results in the type of cases to which they are adapted. Patients seem to be more speedily cured and made non-infectious. Once we have perfected these newer methods, our problem would seem to be to make these newer, more effective means of treatment generally available so that gonorrhea may be cured and rendered non-infectious *speedily*. We can then attack gonorrhea along lines quite similar to syphilis and tuberculosis; namely, find the cases and render them non-infectious by treatment. When this can be done promptly in a large proportion of cases brought under medical supervision, it will be necessary to mobilize public health resources for an active medical attack on gonorrhea.

Meantime we should not forget that to avoid infection with any disease is better than to be cured of it; and that our educational, preventive program should be pushed even more vigorously than before.

I cannot conclude this paper without referring to medical and administrative research problems now being studied in the New York City Department of Health. In the purely medical field, we are studying the biology of the gonococcus and the effects of drugs in experimental animals, Dr. Alfred Cohn having discovered in a brilliant piece of work a method of infecting mice.[13] Cohn has also improved the methods of staining the gonococcus for microscopic examinations and has developed a more satisfactory culture method. Our administrative studies in Staten Island are testing epidemiologic and case-holding procedures; and we are serving Staten Island physicians by offering them the Kline finger blood test for routine application in their offices. Also on the administrative side, the enactment of new and more satisfactory laws requiring pre-marital and prenatal examinations has brought a large additional number of individuals under medical supervision.

On the whole, one may conclude that advances during the last 3 years have carried us a long way in the right direction. Further progress on all aspects of syphilis and gonorrhea control can be expected as one of the results of the recent federal appropriations for this purpose.

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Results of Contact Investigation in Syphilis in an Urban Community*

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ONE of the principal objectives of programs directed toward the control of syphilis is to bring about a reduction in the attack rate of the disease. With the control methods now available this can be best accomplished by decreasing the average period of infectivity, through early anti-syphilitic treatment of persons newly acquiring syphilis. Establishment of easily accessible, well managed syphilis clinics may encourage infected persons to seek treatment earlier than they otherwise would, but a serious obstacle to complete success of this method is offered by the fact that many infected persons are completely unaware of the presence of syphilitic lesions during a period in which these lesions are most highly infective. This is particularly true with regard to females. Moreover, infectious cases of syphilis occur principally among youths and young adults and among the least well informed members of the community. It is of the utmost importance, therefore, that the syphilis control program should include adequate facilities for seeking out persons who are potential sources of infection in order that they may be brought under medical care and rendered non-infectious as promptly as possible.

The most practical method of discovering potential sources of infection is contact investigation, which may be defined as the attempt to identify and bring under medical observation persons who have been in intimate contact with an individual known to have syphilis. Although contact investigation has become an established part of the syphilis control program in the United States, few data are available on the actual results, in terms of new cases of syphilis discovered, that are likely to be achieved. It is evident that incalculable personal values, both on the part of the patient and of the medical personnel, may play an important rôle in determining the results in a given clinic or community. Nevertheless, it seems desirable to analyze the results obtained in various types of communities with a view to establishing an average level of accomplishment for

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this phase of the control program. As one step in this direction there will be presented the results of contact investigation in a series of 247 patients with infectious syphilis admitted to the Syphilis Clinic of The Johns Hopkins Hospital.

From the work of Munson,[1] Smith and Brumfield,[2] L. B. Ingraham,[3] N. R. Ingraham,[4] Kimbrough, Cowgill, and Bowerman,[5] and Clark and Sargent,[6] as well as from the accumulated experience of workers in many syphilis clinics, the practicability of contact investigation has been established. It is difficult, however, to obtain from these papers, with a few exceptions, an estimate of the number of new syphilis cases brought under treatment in relation to the number of original cases studied. It is true that useful data are available on the number of contacts examined, and on various methods employed in bringing these individuals under medical care; but the most reliable measure which can be widely applied would seem to be a ratio based on the number of all previously unrecognized cases of syphilis among contacts to the number of original cases comprising the study.

N. R. Ingraham,[4] reporting the results of contact investigation from two clinics in New Jersey, found that in one clinic, investigation on 70 cases of early syphilis resulted in the discovery of 25 additional cases of syphilis, which is a ratio of 36 contact to 100 original cases. In the other clinic contact investigation on 65 patients with early syphilis yielded 15 new cases of syphilis, which is a ratio of 23 contact to 100 original cases. Clark and Sargent[6] in a series of 431 original or initial cases of early syphilis succeeded in locating and examining 275 persons who were named as contacts. Among this number, however, there were only 52 cases of syphilis which were previously unrecognized and untreated. Of these, 45 were among individuals with presumably infectious syphilis. Thus in this series the result of contact investigation in terms of previously unknown cases of syphilis was approximately 12 contact for each 100 original cases.

SOURCE OF MATERIAL AND METHOD OF STUDY

The material on which this paper is based comprises 247 patients with primary and secondary syphilis admitted consecutively to the Syphilis Clinic of The Johns Hopkins Hospital between September 1, 1936, and June 30, 1938. These patients will be designated "original cases." Only patients who applied voluntarily for admission and who had received no treatment prior to admission are included in the study. Patients with primary and secondary syphilis are designated "infectious cases" on the assumption that they were potential sources of infection in the community. For comparative purposes the results among a group comprising 87 colored patients between the ages 14 and 24 years, inclusive, with latent syphilis will be presented. With few exceptions all the original patients resided within the limits of Baltimore City.

Contact investigation was carried out in the following manner: The clinic physician in charge of the original patient attempted to obtain the names and addresses of persons who might have infected the patient or to whom the patient might have transmitted the disease. Included as contacts were only persons who had been in direct and intimate physical relationship with the original patient, such as by sexual intercourse, by kissing, or by sleeping in the same bed. In most instances exposure was through sexual intercourse. The patient was then referred to the clinic social worker who attempted to secure additional data on sexual and house-

hold contacts. If the contact named was living in the home as a marital partner of the patient, whether or not the couple were legally married, the contact was designated as a "marital contact." If the contact was not living in the home with the patient, the individual was termed a "non-familial" contact. A few persons, not marital contacts, who had been in intimate contact with a patient within the home, were also examined. These have been designated "household contacts."

The information regarding contacts obtained from patients proved to be of varying grades of usefulness. In many instances names and addresses, later proved accurate, were obtained. Contacts were frequently located when either or both the name and address were incomplete. In contrast to these, however, patients frequently referred to individuals as their contacts but gave identifying data so incomplete that no further investigation was possible. For the purpose of this study a contact was considered "named" if sufficient data were available to enable the social worker to start a search for the individual. Contacts residing outside Baltimore City or its suburbs are not included in the study, although efforts were made through the state health department concerned to have such contacts examined. It should be emphasized that perhaps the most important part of contact investigation is carried out in the clinic. Time and patience devoted to obtaining accurate and complete information from the original patient will save many home visits and much time in bringing the patients' contacts under observation.

The patient was asked to give each contact named a printed card requesting the contact to report promptly to this or some other clinic or to his family physician for examination. If the patient refused to do this or if a check of these agencies within a few days revealed that the contact had not reported, the social worker made a visit to the contact's home or place of employment in order to urge him or her to report. If one visit was not successful, frequently others were made. The contact was approached tactfully without the name of the original patient being used, and it was rare that the efforts of the social worker were resented by the person named as contact or by the patient naming the contact.

Contacts upon whom information with regard to syphilis was obtained have been divided into four groups, as follows: (1) infectious cases, (2) latent cases, (3) syphilis known previously, (4) non-syphilitic. The group of infectious cases comprises those with primary or secondary syphilis. The group of latent cases comprises persons in whom a diagnosis of syphilis was made on the basis of a positive serologic test of the blood but who presented no manifest lesions of the disease. This group also includes a few persons found upon examination to have syphilis but in whom no details regarding the stage of the disease were available. The group designated "syphilis known previously" comprises persons named as contacts who were found to be already under treatment for syphilis or to have been treated at some previous time. As a rule, information on these persons was obtained from health department or clinic records. The non-syphilitic group comprises those persons found not to have syphilis. As a rule the last observation on these persons was several months after the original patient had been rendered non-infectious by treatment.

When a contact brought into this clinic was found to have infectious syphilis an effort was made, in turn, to identify and examine his own contacts. These infected contacts were not counted as original cases. Among the contacts of contacts were only a small

number with syphilis (11 in all), and these have been included in the analysis of the main group of contacts.

One practical difficulty encountered in contact investigation was that concerned with determining the probable period of infectivity in the original case. This was particularly true with regard to female patients. Often, it could not be determined accurately whether a contact named had been exposed to the original patient during or before the period of infectivity. No attempt has been made, therefore, to divide the contacts with regard to whether exposure was antecedent or subsequent to infection of the original patient. Since we are here interested principally in the number of new cases of syphilis brought to light through contact investigation, the number of contacts named or examined, or the time of exposure to the original case is of secondary importance. We wish to stress the end results in terms of sources of infection, rather than the mechanism of arriving at this result.

RESULTS OF CONTACT INVESTIGATION AMONG INFECTIOUS CASES

The distribution of original cases by race and sex, the number of these patients naming contacts, and the total number of contacts named are shown in Table I. Likewise shown are the distribution of the contacts according to the relationship to the original case and the number of contacts examined, together with their distribution according to diagnostic classification. For each race and sex are shown the ratio of infectious cases discovered, and of all cases of syphilis newly discovered, to original cases. These ratios may be used as an index to the actual results achieved by contact investigation.

For the entire group of 247 original cases there were 322 contacts named. Of these, information regarding syphilis was obtained on 237, which is in the

TABLE I

Result of Contact Investigation in a Series of 247 Patients with Primary or Secondary Syphilis

Data on Original Cases			Data on Contacts				Diagnostic Classification					Ratio	
Race and Sex	Number	Number Naming Contacts	Number of Contacts Named	Type of Contact and Number		Number Examined	Infectious Syphilis	Latent Syphilis	Syphilis Known Previously	Non-syphilitic	Total New Cases	Number of Infectious Contact Cases to 100 Original Cases	Number of Infectious and Latent Contact Cases to 100 Original Cases
White Male	37	23	29	Marital	16	15	9	2	0	4	19	41	51
				Non-Familial	13	12	6	2	2	2			
White Female	17	13	22	Marital	8	4	1	1	1	1	5	18	30
				Non-Familial	13	9	1	1	3	4			
				Household	1	1	1	0	0	0			
Colored Male	85	56	104	Marital	20	15	5	5	2	3	36	25	42
				Non-Familial	84	60	16	10	16	18			
Colored Female	108	86	167	Marital	35	29	11	8	7	3	54	32	50
				Non-Familial	126	86	20	10	29	27			
				Household	6	6	4	1	0	1			
Total	247	178	322			237	74	40	60	63	114	30	46

ratio of approximately one contact to each original case. Of the 237 contacts on whom information was obtained as the result of contact investigation, 74 were found to have primary or secondary syphilis, which gives a ratio of 30 infectious contact cases to each 100 original cases. In addition 40 other contacts were for the first time discovered to have syphilis, without manifest lesions. Contact investigation, therefore, was responsible, in part at least, for bringing under medical care 114 previously unknown cases of syphilis, approximately two-thirds of which were potentially infectious. The ratio of previously unknown cases of syphilis among contacts was 46 contact cases to 100 original cases.

It is of considerable interest that, of the contacts located, 60 or approximately one-fourth were found already to be under treatment for syphilis or had been under treatment previously. Obviously, these cases cannot be credited to the results of contact investigation. Rather, they form a group in which contact investigation was inadequately carried out by some other treating agency.

Approximately one-fourth of the contacts examined proved to be non-syphilitic after adequate periods of observation, despite the fact that they were named as contacts of patients with known infectious syphilis. It is not known whether these persons represent instances in which exposure occurred only prior to onset of the disease in the original patient, or whether other factors affecting communicability were operative. Suffice it to say that the information obtained from the original patient did not permit of an accurate prediction regarding the result of examination in the contact.

There was no pronounced difference in the results of contact investigation obtained among whites and negroes or in the two sexes of each race. The results appear to be poorer for the group of white females than for the other groups, but the numbers are small and the differences are not statistically significant. Indeed, any of the differences noted could well have been due to chance alone.

TIME ELAPSING BETWEEN ADMISSION OF ORIGINAL CASE AND EXAMINATION OF CONTACTS

The value of contact investigation will probably be in direct proportion to the length of time by which the infectious period is shortened in those contacts who have syphilis. It is exceedingly difficult to obtain precise data on this point, but the available evidence suggests that many infected contacts were brought under medical observation sooner than if they had been left to apply voluntarily for medical care.

Among white contacts, excluding those already under treatment, 56 per cent of those found to be syphilitic came under medical observation within 1 week of the date of admission of the original case, and 78 per cent within 4 weeks. The apparent cause and effect relationship is too strongly evident here to be ignored, particularly in view of the fact that many infected contacts were unaware of the presence of lesions. Among colored contacts 33 per cent of those found to be syphilitic, and not already under treatment, came under observation within 1 week, and 50 per cent within 4 weeks. Of interest is the fact that among both white and colored contacts those eventually proved to be non-syphilitic did not report as promptly, on the average, as did those with syphilis.

Another finding, which strongly suggests that the period of infectivity was materially shortened in some infected contacts, is the fact that in 2 male contacts and 5 female contacts the first

clinical or serologic evidence of syphilis developed after the individual came under medical observation. Moreover, in 13 male and 10 female contacts the disease was in the primary stage when the individual came under the care of a physician. In this series of infectious contact cases, then, 45 per cent of the males and 42 per cent of the females came under medical care before or during the primary stage of the disease. Of approximately 6,000 infectious cases, including contact cases, admitted to the Syphilis Clinic of the Johns Hopkins Hospital between 1918 and 1936, 34.1 per cent of the males and 9.6 per cent of the females were in the primary stage of syphilis. It would seem, therefore, that females in particular were reaching the clinic earlier because of contact investigation.

CORRELATION OF VARIOUS SOCIAL FACTORS WITH THE RESULTS OF CONTACT INVESTIGATION

In the foregoing section the results of contact investigation have been computed in terms of the number of original cases in the series. In this section some of the social factors which may affect these results will be discussed. In general the percentages will be based on the number on whom information was obtained, but it must be noted that such figures have significance only when related back to the number of original cases.

A slightly higher proportion of female original patients named one or more contacts than did the males of either race (79 per cent and 65 per cent, respectively). White patients named a proportionately smaller number of contacts than did colored patients, but of the contacts named there was no significant difference in the proportion of each race that was examined (80 per cent of the white contacts and 72 per cent of the colored). Of the contacts upon whom information was obtained a smaller proportion of white contacts were known previously to have had syphilis than was the case among colored contacts (14.5 per cent and 20 per cent, respectively), but the proportion of non-syphilitic contacts was about the same in each group.

A larger proportion of the white original cases named marital partners than did the colored original cases (44.5 per cent and 28.5 per cent, respectively). Of the marital contacts named a somewhat lower proportion of the colored was examined as compared with the white (70 per cent and 80 per cent, respectively), but the differences are not statistically significant. A lower proportion of non-syphilitic individuals was found among the entire group of marital contacts examined than among the group of non-familial contacts (11.1 per cent and 30.5 per cent, respectively).

RESULTS OF METHODS UTILIZED IN CONTACT INVESTIGATION

In the series of patients under study the approach to the contact was through a card or letter transmitted by the original patient, through a letter posted to the contact, or through a visit by the clinic social worker or nurse. Since in individual instances there was some overlapping of these methods, an accurate appraisal of the results of each cannot be made, but the following observations may be noted.

Among white contacts 83 per cent of the marital and 44 per cent of the non-familial contacts reported as the result of a contact card alone. Among colored contacts, 60 per cent of the marital and only 12 per cent of the non-familial contacts reported as a result of a contact card. One or more home visits were made to 44 per cent of the white non-familial contacts and

to 81 per cent of the colored non-familial contacts. Possibly had not home visits been made promptly, usually within 2 weeks of admission of the original case, a larger proportion of contacts would have reported solely through the efforts of the original patient, but no definite data are available on this point.

The method of employing a letter by post to the contact has not been used extensively because of the general impression among the clinic personnel that it is not an effective method in this community. In rural areas it may be much more useful and may greatly reduce the number of visits required of the social worker or public health nurse.

NUMBER OF HOME VISITS MADE

For all of the 262 contacts named and not already known to another agency 258 home visits were made, or slightly less than one visit per contact named. Of the entire group of contacts, 177 were examined and 258 visits were made, giving a ratio of 1.5 visits per contact examined. Since 74 infectious contacts were brought under medical care, this gives a ratio of 3.5 visits per infectious case discovered. The ratio of visits to the total number of syphilis cases discovered is 2.2 visits per case.

RESULTS OF CONTACT INVESTIGATION AMONG LATENT CASES

For comparative purposes the results of contact investigation among a group comprising colored persons with latent syphilis between the ages 14 and 24 years, inclusive, have been analyzed. These cases represent consecutive admissions to the Syphilis Clinic of The Johns Hopkins Hospital during the period covered by the study. (There were too few white patients of similar ages to include in the analysis.) Of 87 original cases 60 named 83 contacts, and of the contacts named 46, or 55 per cent, were examined. Among this number 3 cases of infectious syphilis and 11 cases of latent syphilis were discovered; 13 contacts were already known to have syphilis and 19 were found to be non-syphilitic. The ratio of contacts with infectious syphilis to original latent cases is approximately 3:100 and of all contacts with previously unrecognized syphilis 16:100. A comparison of the results among latent colored syphilitics with those among white and colored infectious original cases is shown in Table II. The results of contact investigation among this group of young latent syphilitics is not strictly comparable to the results among the group of original infectious cases, for undoubtedly a greater amount

TABLE II

Comparison of Results of Contact Investigation on Groups of White and Colored Original Patients with Infectious Syphilis and Young Colored Patients with Latent Syphilis

Original Cases			Contacts			
			Infectious Cases		All Previously Unrecognized Cases of Syphilis	
Type	Race	Number	Number	Ratio to 100 Original Cases	Number	Ratio to 100 Original Cases
Infectious	White	54	18	33	24	44
Infectious	Colored	193	56	29	90	47
Latent	Colored	87	3	3	14	16

of energy and enthusiasm was put into investigation of the contacts of the latter group. Nevertheless, the results suggest conclusions which are in accord with the prevailing opinion among syphilologists, namely, that not many sources of infection in the community will be discovered through contact investigation of latent syphilitics. Further studies, however, should be made on this question.

COST OF CONTACT INVESTIGATION

Only a rough approximation to the cost of contact investigation can be made in this series of infectious and latent original cases. Since this is a teaching clinic, postgraduate students have assisted in all phases of the work. Moreover, other duties such as the follow-up of patients delinquent from treatment and social service case work have been intermingled with those related more directly to contact investigation. However, a large part of the burden of contact investigation has been carried by one social worker, and it is conservatively estimated that fully half of this worker's time has been devoted to that work alone.

Computed on an annual salary of $1,500 for the 22 months covered by the study, the cost of this service was $1,375. This represents a minimum figure and does not include the cost of transportation, telephone, or postage. Altogether 128 previously unrecognized cases of syphilis were brought under treatment, 114 as contacts of infectious cases and 14 as contacts of latent cases. This figure divided into $1,375, the cost of the social worker's services, gives the cost per case as approximately $10. Computed on the same basis, the cost per infectious case brought under treatment was about $18 ($1,375 divided by 77).

Whether these figures are high or low in comparison to the cost in other clinics or health districts is not known, for no other estimates based on the cost per new case brought under treatment are available. In one large urban clinic [3] the cost per contact examined was estimated to be $5.22, but no data are available from that study on the number of contacts found to have syphilis. Perhaps the figures given for our clinic are unduly high due to the fact that this clinic serves also as a teaching center. It would be interesting to have cost estimates derived from clinics devoted more exclusively to the treatment of large numbers of persons with syphilis.

DISCUSSION

One of the important aspects of the syphilis control program is that concerned with the measurements of results achieved by various methods employed in different phases of the program. It is suggested that the results of contact investigation should be estimated in terms of new cases of syphilis brought under treatment in relationship to the number of original cases in the series. Proportions or ratios based on other figures may not be free from sources of error because the number of persons naming contacts and the number of contacts named may vary greatly in different clinics, according to different criteria for designating a contact as "named." For example, personal data available for identifying a contact vary so much that it is often difficult to decide when a contact has been named. Again, it is often exceedingly difficult to estimate the period of infectivity in an original case, hence assigning a person as a contact during the period of probable infectivity of the original case is often a matter of individual judgment. The basic figures used in this study, number of original cases, and number of previously unrecognized cases of syphilis among the

contacts, are easily ascertainable and are not subject to errors of selection.

While the immediate results of contact investigation can readily be measured, it is not possible yet to determine the ultimate results to the community as a whole. Evidence is at hand which indicates that from 1932 to 1937 there was little or no change in the number of new syphilis cases occurring in the Eastern Health District of Baltimore City, from which area many of the individuals in the present study were drawn, despite the fact that good treatment facilities were available during this period. Perhaps energetic contact investigation may help to change this trend. During the past 2 years at least 77 persons who were potential sources of infection in this community were rendered non-infectious fairly promptly after an effort was made to bring them under treatment. It would appear that the average period of infectivity was shortened in this group of cases and there are sound reasons, based on epidemiological principles, for believing that some new cases of the disease were thereby prevented. Whether the results were worth the estimated cost of contact investigation must be at present largely a matter of opinion; it is our opinion that the results achieved in this series of patients were well worth the cost.

SUMMARY

1. In a series of 247 original patients with primary or secondary syphilis contact, investigation is credited with bringing under treatment 114 previously unrecognized cases of syphilis. This is a ratio of 46 contact cases to 100 original cases.

2. Of the contacts examined 74 had primary or secondary syphilis and were obviously potential sources of infection in the community. The ratio of infectious contact cases to original cases is 30:100.

3. Of the total contacts on whom information was obtained approximately one-fourth were already under treatment for syphilis by some agency at the time the original case was admitted to this clinic. Likewise, approximately one-fourth of the contacts examined proved not to have syphilis.

4. There was no significant difference in the results of contact investigation between white and colored patients or between male and female. Of the contacts examined, 11.1 per cent of the marital contacts were non-syphilitic compared with 30.5 per cent of the non-familial contacts.

5. In a series of 87 original cases comprising young colored adults with latent syphilis, contact investigation yielded 3 previously unrecognized infectious cases and 11 other cases of syphilis.

6. An estimate of the cost of contact investigation in this series shows that each previously unrecognized case of syphilis brought under medical care cost approximately $10, and each infectious case cost about $18.

ACKNOWLEDGMENT

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Mean Annual Hours of Sunshine and the Incidence of Dental Caries*

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A SURVEY made under the direction of the U. S. Public Health Service covering dental examinations of over 1,500,000 children has been published.[1] † It seems worth while to evaluate such extensive data in relation to other factors than those indicated in the *Bulletin*. The data available on seasonable incidence of dental caries [2, 3] suggest the interesting problem of ascertaining whether or not a correlation can be established between caries incidence and hours of sunshine available per annum. The U. S. Weather Bureau data on hours of sunshine serve as a reliable source of information on the latter variable.[4] ‡

The present report covers only a small portion of the projected plan, namely, the 12–14 year age group of the white boys residing in rural and semirural areas of the United States. In the original *Bulletin* the greatest emphasis was placed on city populations. For the present study, we have chosen the non-city groups (population groups below 5,000), which in many respects are probably more homogeneous than the population of towns and cities with their more variable ethnological groups and more diverse habits of living. There are 94,337 boys of 482 communities of 24 states in this group.

From the original data, the caries incidence per 100 children was determined by totalling the numbers of fillings in the temporary and permanent teeth, the numbers of cavities in the temporary and permanent teeth, and the numbers of extracted teeth, as reported by Mills.[5] The number of individuals in all 482 community groups was then arranged in a frequency table having class-intervals of 50 cavities per 100 boys (Table I, Column A).

From the grouped data, the arithmetic mean, the standard deviation, and the mean's probable error were determined.* The mean, 353.50 cavities per 100 boys, is many times greater than its probable error, ± 0.295; therefore, we can safely assume that the mean value is representative of the hypothetical universe from which the sample is drawn, and that any error

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† Included in this study are additional but unpublished data from the same survey, used with the courtesy and permission of the Surgeon General.

‡ The methods of collecting these sunshine rates are described in the Weather Bureau *Bulletin 802*, U. S. Department of Agriculture, "Instruction for Care and Management of Electrical Sunshine Records," Circ. G., Instrument Division, Fifth Edition, by C. F. Marvin.

* Details of statistical calculations will be furnished those interested. The unpublished data used with the consent of the Surgeon General will also be supplied by the author.

TABLE I

Dental Cavities, per 100 Boys, of 12 to 14 Year Old White Boys, Living in Rural Areas or Towns of Less Than 5,000 Population Which Receive Varying Mean Annual Amounts of Sunshine, in Hours

	A	B	C	D	E
	Total—All Areas	*Areas of More Than 3,000 Hours*	*Areas of 2,999–2,600 Hours*	*Areas of 2,599–2,200 Hours*	*Areas of Less Than 2,200 Hours*
Number of boys involved	94,337	1,775	48,718	41,013	2,831
Average number of cavities per 100 (arithmetic mean)	353.50 ± 0.29 ($\sigma = 133.50$)	290.50 ± 1.79 ($\sigma = 112.00$)	323.00 ± 0.36 ($\sigma = 119.00$)	375.65 ± 0.42 ($\sigma = 127.00$)	485.75 ± 2.04 ($\sigma = 161.00$)
Difference between means of succeeding "sunshine hour" groups	(C–B) → $323.00 - 290.50 = 32.50 \pm 1.83$				
	(D–C) ——→ $375.65 - 323.00 = 52.65 \pm .56$				
	(E–D) ——→ $485.75 - 375.65 = 110.10 \pm 2.08$				

Frequency Distribution of Caries Rates

Cavities per 100 White Boys Aged 12 to 14	*A 94,337 Boys*	*B 1,775 Boys*	*C 48,718 Boys*	*D 41,013 Boys*	*E 2,831 Boys*
0– 49.9	0	0	0	0	0
50– 99.9	854	0	854	0	0
100–149.9	2,168	282	1,481	405	0
150–199.9	8,406	138	5,974	2,193	101
200–249.9	12,328	304	6,231	5,793	0
250–299.9	11,415	251	7,596	3,179	389
300–349.9	13,640	202	7,138	6,152	148
350–399.9	13,823	99	6,228	7,275	221
400–449.9	10,708	438	5,603	4,290	377
450–499.9	9,583	43	4,171	5,086	283
500–549.9	6,031	18	1,637	3,923	453
550–599.9	2,159	0	1,347	692	120
600–649.9	1,633	0	419	949	265
650–699.9	492	0	0	492	0
700–749.9	484	0	39	148	297
750 & above	613	0	0	436	177

introduced by chance or accidental sampling is negligible.[6, 7, 8]

From the official weather map furnished by the U. S. Weather Bureau "the mean annual amounts of sunshine, in hours" for various sections of the United States were determined. The observations from which this map is made are recorded at some 90 meteorological stations. For this study, these sunshine values are arranged into four divisions: (a) those areas having more than 3,000 hours; (b) those having 2,999 to 2,600; (c) 2,599 to 2,200; and (d) less than 2,200 hours of sunshine per year respectively.

Frequency distributions of caries rates were made according to the mean annual sunshine value in hours for the community in which the children resided (Table I, Columns B, C, D, and E).

The arithmetic mean and the standard deviation with their probable errors were determined for each group. The means are 290.50 ± 1.79 cavities per

100 boys for the group living in localities having more than 3,000 hours per annum; 323.00 ± 0.36, 375.65 ± 0.42 and 485.75 ± 2.04 in the B, C, D, and E groups respectively. In each case, the relations between the successive means and their probable errors is so great as to make it safe to assume that the mean values are representative of the respective hypothetical universes from which the samples are taken. The locations of the areas having the various mean annual amounts of sunshine in hours, are shown in Figure I. The mean caries incidence for those areas are graphically expressed in Figure II.

The probable errors of the differences between these various means have been determined. The difference between the means of the B and C groups is 32.50 ± 1.83; of the C and D groups 52.65 ± 0.56; and the D and E groups 110.10 ± 2.08.

The lowest value is that between the B and C groups, but there the difference between the means exceeds the probable error of that difference 17.7 times.*

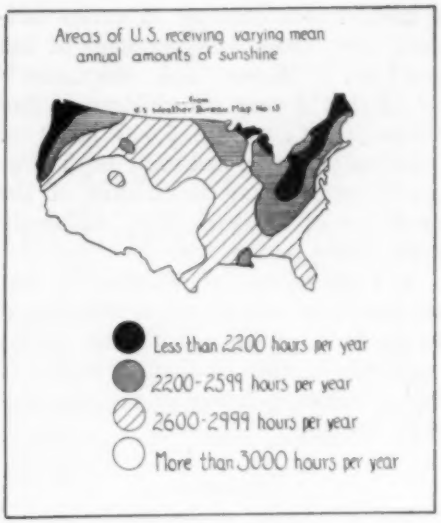
Areas of U.S. receiving varying mean annual amounts of sunshine
Less than 2200 hours per year
2200-2599 hours per year
2600-2999 hours per year
More than 3000 hours per year

FIGURE I

DISCUSSION

Jessen has written, "The conception that the weather exerts an influence on health of mankind is as old as the treatment of illness itself" (translation).[9] Emerson has reported the influence of sunshine on growth of children and has noted that the incidence of acute infectious disease is lowest during the season having the greatest amount of sunshine.[10] The relation of the seasons and dental caries incidence has been reported by McBeath and Zucker [2] and Erpf.[3] In both investigations marked decrease in caries incidence was found in the months of greatest sunshine, when compared with those months having less sunshine.

Examinations of Indian children by members of the U. S. Public Health Service [11] seem to establish that those resident where the sun shines the greatest number of hours per year have

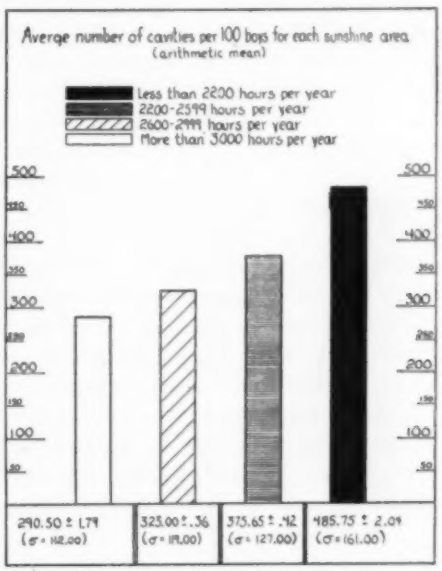

FIGURE II

* The chances are less than 1,000,000,000 to 1 that the observed difference between any two of the means is due to chance distribution. See: Sherman, Henry C. *Chemistry of Food & Nutrition*, Appendix D, Macmillan, 1937.

a coincidental decrease in caries incidence over those living in areas of less sunshine. Moore and associates[12] found that 5 year old children of San Diego, Calif., having 3,000 hours of sunshine per year, had only one-half as much dental decay as children of the same age of Portland, Ore., with only 2,000 hours per annum.

The statement of Bunting[13] that sunshine has no correlation with dental decay is at variance with the results obtained in this statistical study of 94,337 children living in various sunshine areas.

SUMMARY

1. The mean caries incidence of 94,337 white boys, 12 to 14 years of age residing in rural and semi-rural areas of 24 states during 1934–1935, was 353.50 per 100 boys.

2. The mean caries incidence of these boys varies inversely with the hours of sunshine prevailing at their places of residence. The group residing in the area having over 3,000 hours of sunshine per year had 290.50 cavities per 100 boys; the 2,600–2,999 hour group, 323.00; the 2,200–2,599 group 375.65; and the group with less than 2,200 hours 485.75 cavities per 100.

3. The data presented suggest an inverse relationship (not necessarily causal) between the caries-attack rate among samples of white boys 12 to 14 years of age, and the mean annual number of hours of sunshine recorded for the places of residence of these children.

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Epidemiology of Epidemic Encephalitis in California*

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EARLY in the summer of 1937 increases in the incidence of poliomyelitis and encephalitis were noted in the San Joaquin Valley area of California. While the number of cases was not great, many were severe and the mortality rate was high. It was assumed at first that we were having an unusually high incidence of the encephalitic form of poliomyelitis, but as time went on it became evident that we were dealing with a disease entirely distinct from poliomyelitis which from the clinical standpoint corresponded closely to the outbreak experienced in St. Louis in 1933.

The medical profession was unaware of the presence of the St. Louis virus in the state—consequently the true nature of the early cases was not suspected. These were often diagnosed as poliomyelitis, polioencephalitis, epidemic encephalitis, epidemic meningitis, aseptic meningitis, lymphocytic or choriomeningitis, depending upon the predominating symptoms. For this reason the exact number of cases was difficult to ascertain as some of the above diseases are not reportable in California. Tuberculous meningitis was also frequently considered, especially during the early part of the illness. Undoubtedly many of the earlier cases escaped our attention entirely.

The unusually high fatality rate, together with the high incidence of cases manifesting pronounced lethargy, focused our attention on them. Inasmuch as no outbreaks of encephalitis suggestive of the St. Louis type had been recognized in California previously, it was believed that the information accumulated in this outbreak would be of value, even though the epidemic could hardly be considered as of major proportions.

A comparison with past years' experience in poliomyelitis and epidemic encephalitis, Table I, shows a definite increase in the prevalence of the latter in 1937, the number of cases for that year being double the usual expectance.

Clinically, these encephalitis cases were similar to those described by Hempelmann in the 1933 epidemic at St. Louis.[1] They were characterized by profound prostration, sudden onset with high fever, severe headache, backache, chills or chilly sensations, nausea, vomiting, and convulsions were encoun-

* Read before the Epidemiology Section of the American Public Health Association at the Sixty-seventh Annual Meeting in Kansas City, Mo., October 27, 1938.

tered frequently in children. Mental confusion, apathy, tremors, especially of the tongue and hands, and difficulty in speaking were often noted early in the disease.

The most constant single symptom was fever. This was unusually high, much higher than seen in the typical case of poliomyelitis. Temperatures of 105° and 106° F. were common, even in adults. Sixteen cases showed fever in excess of 106°F., and all but one of these resulted fatally. The exceptionally high fever and profound prostration presented an obvious and striking contrast to the usual case of poliomyelitis. Upon entering the room of these patients the contrast was noticeable.. Also, none exhibited the apprehension and dislike at being disturbed so often observed in poliomyelitis with pronounced hyperesthesia. The case of average severity ran a high fever for from 5 to 7 days and dropped by lysis—the usual case returning to normal in from 10 to 15 days.

TABLE I

Epidemic Encephalitis and Acute Anterior Poliomyelitis in California*

	Encephalitis		*Poliomyelitis*	
	Cases	*Deaths*	*Cases*	*Deaths*
1930	82	57	1,903	157
1931	56	40	293	48
1932	57	38	191	31
1933	44	31	170	14
1934	45	22	3,399	110
1935	66	23	831	67
1936	67	34	388	38
1937	122	51	664	78

* All forms

Headache was a rather constant symptom and usually severe. There was no definite localization characteristic of the disease. Lumbar puncture with removal of fluid usually produced prompt relief of the headache for several hours.

Nausea and vomiting were present at the onset almost invariably in the younger age groups. In very young children convulsions were often noted. Tremors of the hands, tongue, and lips occurred, especially when the patient was disturbed, was trying to concentrate on questions or attempting to make purposeful movements.

Mental confusion, disorientation, apathy, listlessness, drowsiness, semicoma, and lethargy occurred in some degree in practically all cases; at least 75 per cent having a very definite lethargy. As a rule lethargy developed within a day or two after onset, becoming deepest at about the 5th to 7th day, gradually decreasing until the patient became practically normal in 10 to 14 days, although some patients continued to have sluggish mental reactions and apathy longer. Often the lethargy was profound and the patient could be aroused only with difficulty. Many of the fatal cases developed a condition undistinguishable from coma out of which they could not be aroused. The lethargy was such that the patient could be aroused and answer questions only to drop off immediately or while making the effort. A few showed no lethargy whatever; on the contrary, these had stages of mild excitement and delirium.

Nuchal pains and neck stiffness were common symptoms. Many complained of pain in the lower back. The neck rigidity was pronounced, a few (13 per cent) even having definite opisthotonos. Thirty per cent had positive Kernigs. The pronounced meningeal symptoms exhibited by some of these patients, combined with rather high cell counts, justified the provisional diagnosis of epidemic meningitis, made so frequently.

There seemed to be nothing uniform about the reflexes. Even in the same individual these varied from day to day. Absence of the abdominal reflexes was common. More often than not the tendon reflexes were exaggerated, sometimes markedly. The plantar reflexes, Gordon, Babinski, and Oppenheim, were quite variable.

Ocular manifestations were rare in contrast to the ordinary forms of encephalitis. Occasionally the patient complained of double vision and blurring. Strabismus and nystagmus were rarely observed. In a few instances reaction to light was sluggish.

Retention or incontinence of urine or feces was observed. Hyperesthesias were very uncommon; few patients exhibited any distress in manipulation of extremities other than in those instances when such manipulation incited tremors and spasticity.

Fifty per cent showed some degree of paralysis, mostly of a spastic nature. Often the patient had a lead-pipe rigidity of the extremities with greatly exaggerated reflexes. Difficulty in swallowing and loss of speech were noted. In most patients, the paralysis was temporary and cleared up with clinical recovery, although a few had a spasticity of all extremities lasting for several weeks, and in 2 this persisted for months. Most of those patients showing absence of reflexes and flaccidity of muscle groups died and these symptoms were noted shortly before death. Some of the recovered cases, however, had a temporary flaccid paralysis involving one or more muscle groups.

While there was considerable variation in the spinal fluid findings, as a rule the fluid was under slightly or moderately increased pressure, usually clear, but occasionally ground glass or slightly cloudy in appearance, with the cell count ranging from normal limits to 1,000 or more. The average count was from 200 to 400 cells with lymphocytes predominating, even up to 100 per cent. Sugar was not reduced and globulin was usually within normal limits or slightly increased. The spinal puncture was followed almost invariably by considerable relief, with less headache and more comfortable rest.

Some patients had extremely virulent infections resulting in deaths within 4 to 6 days. In this series of 102 cases, 40, or 39.2 per cent, were fatal. This corresponds with a fatality rate of 37 per cent for the Paris, Ill., outbreak in 1932,[2] 20 per cent in St. Louis, in 1933, and 28 per cent [3] in Toledo in 1934. Seventy-five per cent of all our deaths occurred before the 10th day, and 50 per cent before the 7th day. Those surviving over 12 days had a very good chance for recovery.

Epidemiologically, the disease was most interesting, especially from the standpoint of geographical distribution. The cases occurred in the San Joaquin Valley, an agricultural area with extensive irrigation, containing a number of small cities but no large metropolitan areas. Even in this area the cases were distinctly in rural sections. No cases occurred in the mountainous regions; and large population centers, such as San Francisco and Los Angeles, were singularly free from the disease.

The two counties reporting the largest number of cases were Fresno and Tulare, with populations of 150,304 and 84,432, respectively. Table II shows the geographical distribution of the 102 cases. Thus, Los Angeles County with a population of 2,691,707 reported 5

TABLE II

Geographical Distribution of Cases of Epidemic Encephalitis—St. Louis Type and Acute Anterior Poliomyelitis—1937

County	*Epidemic Encephalitis*	*Poliomyelitis*
Tulare	29	17
Fresno	28	9
San Joaquin	8	19
Los Angeles	5	245
Santa Clara	5	6
Sacramento	5	17
Kern	5	74
San Diego	4	57
Alameda	3	34
Yolo	3	3
Sonoma	2	5
Contra Costa	1	3
Santa Cruz	1	2
Madera	1	3
San Francisco	1	23
Colusa	1	3
	102	320

cases, while Tulare and Fresno Counties with a combined population of 234,736 reported 37 cases. In these two counties the cases were definitely rural in their distribution, often occurring in individuals living on ranches and in no contact with the public. San Francisco and Los Angeles accounted for only 5 per cent of the cases, although they hold approximately 50 per cent of the population of the state.

The seasonal distribution was similar to that in the outbreaks in the Middle West. The cases were most prevalent during the late summer and early fall —the same season that poliomyelitis was most prevalent. In Table III the distribution by months is shown together with that of poliomyelitis. Eighty-four per cent of the cases of encephalitis occurred during July, August, September, and October, while 80 per cent of the poliomyelitis cases occurred during this same period.

TABLE III

Cases of Epidemic Encephalitis—St. Louis Type and Acute Anterior Poliomyelitis by Months, 1937–1938

Month	Encephalitis		Poliomyelitis	
1937	*Cases*	*Deaths*	*Cases*	*Deaths*
March	1	1	10	1
April	1	..	15	3
May	1	1	22	2
June	3	3	40	6
July	13	7	134	7
August	40	11	157	28
September	22	5	132	12
October	11	4	84	6
November	7	6	36	8
December	2	1	12	5
1938				
January	..	..	9	2
February	1	1	11	1

There were more cases in the younger age groups of this series than were reported in the epidemic in the Middle West, although it is understood that in 1937 an increase in the incidence among the younger age groups in the Middle West was also noted. As indicated in Table IV, 38.2 per cent of the cases occurred in those under 14 years of age, and this group accounted for 35.0 per cent of the deaths. The highest death rates occurred in the age groups 1–4 and over 55 years, each of such group having a fatality rate of approximately 62 per cent. It is realized that the number of cases involved in this series is too small upon which to base definite conclusions. The exceptionally high fatality rate is undoubtedly due to the fact that mild cases were unrecognized.

TABLE IV

Cases of Epidemic Encephalitis—St. Louis Type By Age Groups

Age	*Cases*	*Deaths*	*Per cent Fatal*	*Per cent of Total Deaths*
0–1	3	..	....	....
1–4	13	8	61.5	20.0
5–9	13	3	23.0	7.5
10–14	10	3	30.0	7.5
15–19	14	5	35.7	12.5
20–24	11	4	36.3	10.0
25–34	12	4	33.3	10.0
35–44	9	5	55.5	12.5
45–54	8	3	37.5	7.5
55+	8	5	62.5	12.5
	102	40	39.2	100.0

The sex distribution shows nothing significant—58 males, 44 females. Multiple cases in families were rare. In only one family did more than one case occur; there were 3 cases, 2 of which were mild, and all 3 came down within a period of 6 days. Other than this one instance no case could definitely be traced to contact with a recognized or suspected case.

At postmortems the pathological findings were limited chiefly to the brain and cord. In all autopsied cases the brain showed evidence of edema, congestion of the meningeal and intracerebral vessels, small petechial hemorrhages into the cortex and into the meshes of the pia-arachnoid. In many instances, the brain was quite soft and flabby due to the excessive fluid. The microscopic picture was that of an acute non-purulent inflammation throughout the brain and cord, especially in the pons, medulla, and mid-brain, petechial

hemorrhages and intense vascular congestion with cellular infiltration of both nervous tissue and meninges with various types of mononuclear cells, chiefly lymphocytes, and evidences of toxic degeneration of the nerve cells. These findings correspond to those previously reported for the St. Louis virus.[4]

Unfortunately, brain material in condition suitable for virus studies was obtained in only a few instances, and in those, no virus could be demonstrated. The laboratory work was done by B. F. Howitt,[5] of the George Williams Hooper Foundation, University of California Medical School. In 41 of the cases, virus neutralization studies were carried out by Miss Howitt,[5] using the viruses of lymphocytic choriomeningitis and the St. Louis type of encephalitis.

In 21 cases the virus of the St. Louis type was neutralized while in no instance was the other virus affected. Inasmuch as blood for the most part was obtained only from the milder and recovered cases, it would seem fortunate that so many positive results were obtained. In one instance blood taken a few hours before death neutralized the virus. As a rule, the blood was collected during convalescence.

That the disease was present in California before 1937 is evident. The sera from two individuals who were not ill in 1937 were found to neutralize the virus. One gave a history of an abortive attack of poliomyelitis in 1935, the other an abortive attack in 1936. Both lived in the same county and had not been out of the state. As reported,[6] these individuals may have suffered attacks of encephalitis rather than poliomyelitis, or they may have at some time or other been exposed to the virus and developed sub-clinical infections.

An attempt was made to follow up these patients and determine the extent of after-effects. In spite of the marked toxicity and the severity of the illness, those recovering seemed to have few sequelae. Recovery occurred in 62 cases and 14, or 22.5 per cent, of these showed some disability not present before onset. However, follow-up studies were carried on within less than 6 months after onset and is entirely too short an interval upon which to base conclusions. The most frequent complaint (noted in 6 cases) was weakness, with inability to do as vigorous work as formerly. Four individuals complained of neuritic pains in muscles of the arms and legs. Two complained of frequent and severe headaches. One, a child, had definite impairment of memory; another had signs of internal hydrocephalus. Two showed some muscular incoördination, ataxia and spastic paralysis of one arm, present a year after onset. So far, none has shown any tendency to develop Parkinsonism, although the period is as yet too short to which to draw a conclusion. Bredeck, *et al.*,[7] in a follow-up study on the St. Louis outbreak, report that Parkinsonism was found to be quite uncommon as a residual.

Cases occurring during 1938 are being followed with a great deal of interest. As would be expected the cases are more widely distributed throughout the state, appear to be milder, and the fatality rate is correspondingly low.

CONCLUSIONS

1. This represents the first recognized outbreak of epidemic encephalitis due to the St. Louis type of virus in California.

2. In all, 102 cases were recognized from March, 1937, to February, 1938. There were 40 deaths.

3. Blood was obtained from 41, usually during the stage of convalescence. Twenty-one of these neutralized the St. Louis type of virus.

4. Geographically, the disease was limited to the rural areas of the San Joaquin Valley section of California, while the metropolitan areas were relatively free.

5. A definitely greater incidence of the disease in the younger age groups was noted

than occurred in the St. Louis outbreak of 1933.

6. Three to 6 months after recovery—22.5 per cent of the patients showed some disability which could be attributed directly to the disease. These ranged from headaches and weakness to spastic paralysis and mental changes.

NOTE: While this paper is based principally on cases occurring in 1937, it is felt advisable to mention briefly events during 1938. To date (October 15, 1938) 66 cases of epidemic encephalitis have come to our attention. The geographical distribution has been similar to that recorded last year.

In a number of these cases positive neutralization tests have been obtained with the St. Louis virus. However, some have been negative although the clinical picture was suggestive of the disease, as was noted also last year. Since this paper was written Miss Howitt [5] reports the isolation of the virus of equine encephalomyelitis, Western type, in a fatal case from Fresno County. This case in a child, age 20 months, had a fulminating illness lasting 5 days, characterized by high fever, convulsions, spasticity, opisthotonus, and hyperactive reflexes. The spinal fluid count ranged from 12 cells per cm. to 44 cells per cm., with about 50 per cent lymphocytes. In Kern County, sera from 3 cases of encephalitis in children were found to neutralize the same virus.

Equine encephalomyelitis in horses has been present in California since 1930. In 1933 Meyer [9] reported 3 cases in humans (1 fatal) which he felt were due to this virus. All had been in intimate contact with horses ill with the disease. Fothergill, *et al*,[10] recently reported the isolation of the virus of the Eastern type of equine encephalomyelitis from a fatal case, in a child, age 7 years, who lived in an area in which the disease was present in horses.

Most of the cases reported in this paper resided in areas where equine encephalomyelitis in horses has been present. It is considered a possibility therefore that some of the cases which have been negative for the St. Louis virus, also some of those who neutralized the virus, may have been due to the equine strain. With that in mind sera are now being obtained from many of these persons for neutralization tests with the virus of equine encephalomyelitis.

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Educational Qualifications of Health Officers*

A Report for the Consideration of the Governing Council at the 68th Annual Meeting, Pittsburgh, October 17–20, 1939

THE type of training most desirable for an individual seeking to become a health officer is well recognized. He should have had fundamental training in the sciences and the humanities at least equivalent to that required for a college degree in Arts or Science. He should have completed the course leading to the degree of Doctor of Medicine in a recognized medical school, and should have had at least 1 year of internship in an approved general hospital, including a communicable disease service. In addition to such internship the candidate should be given a preliminary period of supervised field experience in a well organized department of health for a period sufficient to give him acquaintance with the general aspects of public health and to give him also opportunity to determine something of his own liking for the work and his fitness for it. At the end of this preliminary field experience the candidate should receive at least 1 full academic year of graduate instruction in public health in a university. If possible, the candidate should have an additional year of practical experience in a subordinate position before becoming himself responsible for the conduct of the work of a department of health.

However desirable so complete a course may be, it is impracticable at this time to insist that all candidates for appointment comply with these requirements. In view of this practical situation, some modification may temporarily be made in the direction of recognizing the value of practical field experience obtained under competent supervision as in some measure substituting for formal education.

A few exceptional individuals not possessing a medical degree have achieved outstanding success as administrative health officers. It is reasonable, therefore, that the basic training represented by the medical degree, although advisable, should not be considered absolutely essential in the selection of health officers for jurisdictions where the duties of the health officer are mainly administrative, provided the candidate possesses an adequate general and biological education and has received not less than 2 academic years of graduate instruction in public health in a university.

RECOMMENDATIONS

1. That candidates for appointment as health officer should be graduates of approved medical schools who have completed successfully not less than 1 year of internship in an approved hospital and in addition a course of not less than 1 year of graduate instruction in

* The Committee on Professional Education of the American Public Health Association publishes this Report to permit the members and Fellows of the Association to review it and to offer criticisms and suggestions in the further consideration of the Report.
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a university, leading to a degree in public health.*

2. That recognition be given to the fact that practical experience in public health administration is an essential part of the education of a health officer, and that great achievement can usually be attained only after long experience. These facts should always be taken into consideration in the selection of health officers, particularly where the position is one of great administrative responsibility.

The above recommendations are made for the future guidance of officials responsible for the appointment of health officers, and for the guidance of individuals looking forward to careers in public health. In making these recommendations the committee expressly recognizes the professional standing of persons now performing creditable service as health officers.

* Where lack of qualified personnel makes it impossible to require a full year of graduate instruction in public health, the postgraduate requirements considered temporarily as applicable for medical health officers for small jurisdictions may be: the satisfactory completion of not less than 3 months of postgraduate instruction in public health in a university and not less than 3 months of supervised field experience in a well organized health department. Such individuals should be required to complete the course leading to a graduate degree in public health as soon as they have demonstrated ability sufficient to warrant such instruction.

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Desirable Qualifications of Nurses Appointed to Public Health Nursing Positions in Industry*

A Report for the Consideration of the Governing Council at the 68th Annual Meeting, Pittsburgh, October 17–20, 1939

THESE qualifications are suggested as aids to schools of nursing and those arranging public health nursing curricula, in planning future training programs, and as goals for nurses who wish to prepare themselves for service in this important field.

At present the number of nurses who, through education and experience, can meet all of these qualifications is limited. The qualifications, however, may serve as guides to employers in selecting nurses, and to encourage nurses already in service to secure further preparation.

Personal Qualifications:

The following personal qualifications are of the utmost importance for the nurse in industry:

An interest in and ability to work with all kinds of people; good physical health and emotional stability; initiative; good judgment; and resourcefulness. For the nurse working alone without nursing supervision, ability to organize her service also is necessary. The supervisor of other nurses must have qualities of leadership, executive and teaching ability, vision, and imagination.

(An idea of the nurse's personal qualifications may be obtained by personal interview and by reading her record from the nursing school and previous employer.)

Professional Qualifications:

I. For the nurse in an industry which provides supervision by a qualified nurse supervisor set forth under III below.

A. High school graduation or its educational equivalent is essential. More advanced education on a college level is desirable. Ability to use the typewriter and perform other clerical procedures is helpful to the nurse, especially in smaller industries where clerical assistance is limited.

B. Fundamental nursing education. The following are essential:

1. Graduation from an accredited school of nursing connected with a hospital having a daily average of 100 patients or a minimum of 50 patients with one or more affiliations affording supplementary preparation.

a. Instruction and experience in the care of men, women, and children, including patients with communicable disease.

b. Thorough instruction and

* The Committee on Professional Education of the American Health Association publishes this Report to permit the members and Fellows of the Association to review it and to offer criticisms and suggestions in the further consideration of the Report.

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experience in surgical nursing, including operating room and first aid.

2. Instruction and experience are desirable in the following:
   a. Outpatient department, especially in the emergency room.
   b. Psychiatric nursing.

C. State registration.

II. For the nurse in an industry working without the guidance of a nursing supervisor.

This nurse must be able to plan the nursing program under the general direction of the medical officer, and should have a working knowledge of the principles of teaching, social case work, community organization and resources, public health administration, industrial relations, personnel administration, industrial hazards, nutrition, communicable disease, mental hygiene, and personal hygiene, as they affect the individual and his family.

A. All of the preparation listed above under I, and in addition:

1. At least one year of experience under qualified nursing supervision in a public health nursing service in which practice in the application of the above can be secured.

2. An academic year of study in public health nursing in one of the colleges or universities whose program is approved by the N.O.P.H.N.
   a. Where courses in industrial hygiene and safety are available.
   b. Where courses in principles of public health nursing, mental hygiene, social work, preventive medicine, and allied subjects are made applicable to nursing in industry.
   c. Where field work includes some experience in industry.

3. Supplementary experience and instruction in operating room and first aid nursing, if thorough preparation was not included in basic nursing education.

III. Supervisory positions

All the preparation under I and II, and in addition:

Successful experience in industrial nursing, part of which is preferably in the type of industrial work in which she is to act as supervisor.

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GUARDING THE HEALTH OF VISITORS TO THE GOLDEN GATE INTERNATIONAL EXPOSITION

SAN FRANCISCO is having an exposition this year just as New York is. San Francisco calls hers the Golden Gate International Exposition. The Department of Public Health has taken time by the forelock and in conjunction with the Water Department began a survey of the hotels on June 1, 1938, paying particular attention to the plumbing in order to insure a pure water supply to the tremendous number of guests who will undoubtedly visit the city. Especial attention was paid to cross-connections, which are always a danger, and have often allowed nonpotable water in other localities to reach the pure supply with disastrous consequences. The survey was completed by January 1, 1939. There were 651 hotels inspected and all hazardous conditions detected were corrected by January 15, or a month prior to the opening of the exposition on February 17.

In addition to the water supply, the condition of the sewers and the connections were also studied, as were also the fire system, water treatment equipment, and special house storage. Special attention was given to the water fixtures and connections in the kitchens and all departments devoted to the handling of food.

Except for very new hotels, blue prints of the piping are rarely available and those of the original building plans seldom resemble the layout actually found in old structures. Of the 651 hotels inspected, 82, or 12.6 per cent, were found to have one or more serious plumbing hazards, all of which, as pointed out, have been corrected. Advice and instruction were given to proprietors and they were also encouraged to look forward to remodeling and extension as opportunity offered, the gradual replacement plan being favored.

The method of routine bacteriological check of the general water supply of the city has been revised and improved and in addition to the tests of the general water supply, samples are examined once a week from all hotels which have dual supplies. It is felt that visitors can spend as much time in the city as they desire with a high degree of safety from diseases due to defective water supplies.

Treasure Island, the site of the Exposition, is under the Health Director

of the City and County of San Francisco. It is needless to add that every precaution has been taken to render the ground of the Exposition itself safe for visitors. All places supplying food or drink are under careful supervision which will be maintained throughout the time that the Exposition is open. The survey of the water supply, the correction of faults in plumbing, and the improvement in the bacteriological supervision of the water supply will be continued as a permanent benefit to the city under its efficient health system.

RESTORING LOST VITAMINS TO THE DIET

DESPITE the abundance and variety of American foodstuffs, the people of this country are, on the whole, not so well nourished as they should be. Most persons may consume food in sufficient *quantity,* but a surprisingly large proportion of the population apparently fails to select foods that give proper nutritive *quality*. Measured by the accepted standards of human nutrition, our national diet is defective, a fact that has a definite influence upon the state of the public health.

How do we know that the national diet is defective? By computing the actual national consumption of various foodstuffs, such as milk and dairy products, eggs, fruits, vegetables, bread and cereals, meats, and sugar, and comparing these figures with the amounts that would represent better all-round nutrition. Thus, we eat too much raw sugar and do not consume enough pasteurized milk, bread, eggs, fruits and green and yellow vegetables.

Recent investigations of approximately 4,000 food records among families in 43 cities have shown, furthermore, that fully half of these diets needed improvement.[1] Perhaps the most significant of the dietary faults discovered was a lack of sufficient calcium and vitamin A. Many of the diets were also inadequately provided with vitamin B_1 (thiamin), vitamin C (ascorbic acid), and iron. No data are given in this report on vitamin D, but many observations have indicated a paucity of this important food factor in the average family diet.

Assuming that these figures are fairly representative of conditions in the country as a whole, how can this situation be remedied? By improving economic conditions, and by the constant education of the public in the principles of sound nutrition. Public health education must include proper dietary information.

There is another way in which our national nutrition might be improved. If manufacturers and processors of various staple foods would develop methods to retain or restore the natural vitamins and minerals that are sometimes removed from these foods, their popularity and abundance in the diet would assure a greater intake of essential food factors.

Wheat and other grain products are outstanding examples. In the refining of flour, much of the original mineral and vitamin content is reduced. Some of these substances, but not all, are restored when white bread is made with milk solids, as is now the usual custom in the baking industry. White bread is our best and cheapest source of necessary food-energy, and there is no reason why it should not now be liberally used in a well balanced daily diet. but it would be even more valuable if it contained a larger quota of the vitamin B_1 (thiamin) and the iron of the unrefined wheat flour. The same can be said of milled white rice, another common cereal.

This problem of the restoration of lost vitamins to foods received considerable attention at the meeting of the American Institute of Nutrition in Toronto last

April. Various speakers advocated the fortification of our common foods with the vitamins and minerals in which they are often deficient.

Some progress has already been made in this direction. Fluid milk and evaporated milk have been fortified with vitamin D for a number of years, although these irradiated, metabolized, and concentrated vitamin D milks are used by only a relatively small proportion of the general public. Methods of milling white flour to retain vitamin B_1 have also been developed, and a yeast rich in this vitamin is now available for baking purposes, but these salutary methods have not yet been widely adopted. While vitamin A is now added to some of the margarines and other butter substitutes, this essential food factor might well be added to all of the fats that are lacking in it.

Optimal nutrition is one of the most important factors in good health. Modern food manufacturers have a glorious opportunity to contribute to national vitality by increasing the dietary values of their products.

REFERENCE

1. Stiebeling, H. K., and Phipard, E. F. Diets of Families of Employed Wage Earners and Clerical Workers in Cities. *Circ. No. 507.* U. S. Dept. of Agri. Jan., 1939.

PROLONGED PRESERVATION OF FOOD

WHEN we consider the important place which canned foods play in the life of civilized man today, and especially in the United States, it is rather surprising that more is not written concerning them. Scientific men and domestic science teachers know that the commercial canners have well equipped laboratories and employ the most expert scientific men and technicians. Also they take advantage of the services of many of the professors in our best universities; but in spite of all this the public generally and even professional persons, lack to an amazing degree a knowledge of the fundamentals of the great canning industry. Cases of poisoning, such as the deaths from botulism which occurred soon after the World War have attracted considerable attention. One still finds even among educated people superstitions concerning canned foods, the belief, for example, that as soon as air is admitted to a can the contents are liable to become dangerous and even poisonous. For example, in 1935, a national organization issued precautions against accidents in the home and advised the immediate removal of food from cans on opening. Again in 1936 a release by a national press service to newspapers throughout the country gave the impression at least that food left in open cans might become dangerous to health. Even authoritative bodies which should have known better have added to this erroneous idea.

In America there has recently become available an excellent book by A. W. Bitting,[1] than whom there is no one more capable of informing us on this great subject. The section on the history of the art of canning was written by Mrs. Bitting. The subject has been brought to the fore again in an excellent paper,[2] which has brought out valuable comment.[3] This paper gives full credit to Nicholas Appert as having laid the foundation of the modern canning process in 1804. His book went through a number of editions in French as well as in English, and, in spite of the fact that in England Thomas Saddington was given an award by the Society of Arts, he admitted that his ideas were obtained while traveling abroad.

The article just referred to gives in some detail the process developed in England by John Hall of the Dartford Iron Works, and Bryan Donkin, a Fellow of the Royal Society, who substituted the use of iron containers for the glass jars first used by Appert. It must be remembered that Appert later used tin, a good quality of which at that time it was impossible to obtain since the French were poor artisans in working this metal, so that Appert made the cans in his own factory. Later he made his cans of wrought iron which he coated with tin after their manufacture. These contained from 4 to 45 pounds. The seams were brazed, and the cans were so strong that when emptied they were used as casseroles.

How long does a properly canned food remain good? As long as the can remains intact. We have been in the habit of quoting Letheby for the statement that in 1824 a ship with many tins of canned food was wrecked in Prince's Inlet. Eight years later Sir John Ross recovered some of these and although they had been exposed to alternate freezing and thawing they were in good condition. Sixteen years later another lot was found, and in 1868—44 years after the ship was wrecked—the remaining tins were opened by Letheby and found to be in perfect condition. In 1865, severe floods on the Genesee River in New York swept away a number of factories. Sixteen years later canned goods which had been buried in the mud since the flood were recovered and found to be in good condition.

The most recent evidence has been furnished by Professor Drummond and his co-authors. Two canisters of food prepared by the Donkin process, one a 4 pound can of roast veal, from the stores of H. M. S. *Hecla* on Parry's voyages to the Arctic in 1824 and again in 1826, had been put in the museum of the Royal United Services Institution. The second was a 2 pound tin of "carrots and gravy," which had been on the third Arctic voyage in 1924. In opening the cans great precautions were taken to collect the gas. When the can containing veal was opened the gas rushed out under high pressure, certainly more than 15 pounds to the square inch. Chemically this was found to be mostly hydrogen due to the action of the acid soup on the tin lining. The meat was in excellent condition, the odor most appetizing, and though the fat had been largely hydrolized, no trace of rancidity was present. The taste was good, though insipid, and for 10 days maintained the health and normal growth of young rats. Both flavin and vitamin D were found, but vitamin B was absent. Bacteriological examination showed three different types of aerobic spore-bearing bacilli, all of which grew at 55° C. There is no question that these organisms had retained their life in the spore form for more than 100 years, and were probably derived from the flour used to thicken the soup. The can of carrots and gravy was bacteriologically sterile, but showed a high pressure of gas, which also consisted mainly of hydrogen. There was not enough to carry out animal feeding tests for ascorbic acid, but carotene was found in a concentration little below that of fresh carrots. The metal containers were examined in the International Institute for Tin Research, then returned to their owners, where they remain as an exhibit at the Royal United Services Institution in Whitehall.

REFERENCES

1. Bitting, A. W. *Appertizing or the Art of Canning.* The Trade Pressroom, San Francisco, 1937.
2. Drummond, J. C., Lewis, W. R., Macara, T., Wilson, G. S., and Shipp, H. L. *Chemistry and Industry*, 57:898, 827 and 914, 1938.
3. *Brit. M. J.*, Mar. 11, 1939, p. 514.

BOOKS AND REPORTS

The Anaerobic Bacteria and Their Activities in Nature and Disease: *A Subject Bibliography—By Elizabeth McCoy and L. S. McClung. Berkeley: University of California Press,* 1939. Vol. I, 295 pp., Vol. II, 602 pp. Price, $10.00.

This is a monumental work which does not lend itself to the ordinary review. The authors state in the preface that it is the result of approximately 5 years of research, covering some 10,500 original articles in journals, monographs, or other published reports, with 120,000 entries. With a few exceptions, which are noted, each of these articles has been examined in the original and placed in the appropriate subject section. Even after this gigantic task, the authors do not claim that the index is "complete," as certain publications were not available to them.

Volume I is a Chronological Author Index and contains 295 pages. Volume II is a Subject Index and contains 602 pages. As an example of the arrangement, the Subject Index outline is divided into 9 heads, under each of which are subheads, running as high as 15 in some instances. In addition to the general subject matter there are special lists giving Bulletins of Institutes, Governments, etc., which report new data, Monographs, Obituaries, Patents, and Theses.

In the list of Species of Anaerobic Bacteria, there are some 425 spore bearing forms and 246 non-spore-bearing forms given. There are 98 named types of strains and 14 unnamed.

We commenced the notice of this book by calling it a monumental task, and so it is. It would be a bold reviewer who undertook to criticise without giving at least a year of study to it. We can only say here that it has every appearance of being a most carefully prepared piece of work and of being entirely authentic, of which the names of the authors would assure us. We cannot but admire the authors for their conception of the plan and their industry in carrying it out. Even putting it through the press must have been an enormous task.

We can understand the feeling of the authors when, in the last paragraph on page iv, they quote Dr. Heller: "The anaerobist working on bibliography is surely a creature to be pitied, and is not to be blamed for failing to follow the work of others conscientiously and thoroughly." MAZÝCK P. RAVENEL

Reorganization of the National Government: What Does It Involve? — *By Lewis Meriam and Lawrence F. Schmeckebier. Washington: The Brookings Institution,* 1939. 272 pp. Price, $2.00.

While there is virtually nothing about public health in this book, persons who are interested in the possible coördination of some or all of the widely scattered health activities of our national government, and in the general promotion of efficiency and economy in the operations of the federal bureaucracy, will find much of interest and value in this book. The first part, by Mr. Miriam, discusses the philosophy behind the federal reorganization movement, and presents a lucid explanation of all the factors involved in it; while the second part by Mr. Schmeckebier describes the various attempts in the

past to do something about our unwieldy governmental machine. Both authors have devoted many years to research on the federal government and are experts in this field.

JAMES A. TOBEY

Civilization Against Cancer—*By Clarence Cook Little, Sc.D. New York: Farrar & Rinehart,* 1939. 150 pp. Price, $1.50.

In furtherance of the laudable attempt to "fight cancer with knowledge," the managing director of the American Society for the Control of Cancer has prepared this compendium for the general reader. In 12 concise chapters he gives the rules for recognizing malignant growths, describes the history and present organization of the educational activities against cancer, outlines the progress of scientific research on the subject, and discusses various other pertinent aspects of this significant public health problem. Sanitarians will be particularly interested in the exposition of modern cancer research, a field in which the author has distinguished himself. Members of the Women's Field Army against Cancer will find that the book is an excellent guide for their worthy efforts, while other members of the lay public who have the courage to delve into the subject will derive much useful information and possibly some inspiration from this well printed book. JAMES A. TOBEY

The Municipal Year Book, 1939—*Chicago: International City Managers' Association (1313 East 60 Street),* 1939. 586 pp. Price, $5.00.

This sixth issue of the *Municipal Year Book* devotes much more space to individual statistics of cities than previous issues. For the first time the *Year Book* presents an entirely new statistical section covering police, fire, utility, welfare, health, library, and recreation activities.

The *Year Book* is divided into six general divisions: résumé of municipal activities in each of 24 fields in 1938, general governmental data, municipal personnel, municipal finance, municipal activities, and sources of information. For each of the 1,809 municipalities in the United States over 5,000 population, the *Year Book* gives a great deal of information such as number, salary, term, and election date for city council, titles of officials elected by the people, utilities owned, etc. Another section of the book gives for each of 834 cities the number of employees, total salaries and wages, whether a city has a classification and pay plan for employees, and a list of cities in which municipal employees are unionized and to what unions they belong. For each of the 960 cities over 10,000 the *Year Book* lists the names of 12 chief municipal officials.

Two features which greatly increase the utility of this issue are an index to the contents of previous issues and a thumb index which gives immediate access to statistical tables. W. R. W.

Manual of Veterinary Bacteriology—*By Raymond A. Kelser, D.V.M. (3rd ed.) Baltimore: Williams & Wilkins,* 1938. 640 pp. Price, $6.00.

The first edition of this book was published in June, 1927, the second in June, 1933. Since there are few textbooks on bacteriology written from this point of view, the former editions were received with much interest and appreciation by the veterinary profession and the medical profession as well, because of the intertransmissibility of many animal and human diseases.

In this third edition the author has improved the *Manual* very much by the inclusion of new material, and 88 pages have been added. The number of chapters has not been increased, but the old ones have been revised and brought up to date. The chapter on

Bacteriological Examination of Milk and Water is noticeable in this respect. This revision maintains the same high plane which characterized the former editions. It is a valuable addition to literature for veterinary students and those specializing in veterinary bacteriology.

The printing, make-up and illustrations are good. A. J. DURANT

Big Fleas Have Little Fleas, or Who's Who Among the Protozoa—*By Robert Hegner. Baltimore: Williams & Wilkins,* 1938. 285 pp. Price, $3.00.

BIG FLEAS Have LITTLE FLEAS
Upon Their Backs to bite 'em
And LITTLE FLEAS Have LESSER FLEAS,
And so, AD INfinitum.

We wonder whether this presages a new type of textbook, a sort of intellectual painless dentistry, as it were! While the versicle which serves as the text for the author has been known for many years, no one has ventured to write a book in the same vein on such an abtruse subject as protozoölogy. The illustrations are plentiful and good. Alongside of correct representations in black and white, many beautifully done, we have caricatures which will not only fix the appearance of the organism, if not its name—*Acanthocheilonema* for example—in the mind, but will also impress upon the reader the many different types of these early forms of life and perhaps more so their various activities and modes of living, often at the expense of a human host. Most of these are extremely clever.

The author is one of the outstanding protozoölogists in this country and no one is better qualified than he to tell us about the protozoa. The scientific material is sound and most interestingly told. Interspersed throughout the text are a number of poems which prove that the author is as familiar with his hymn book as with Pinafore. These are extremely amusing and all tell their story.

There are very interesting accounts of the author's trips into the jungles of the Philippines, where they hunted calingas and crocodiles for the sake of their protozoölogical contents, and in Tropical America where they hunted monkeys for the same purpose. These trips led to the production of a poem, the first two verses of which read:

In Filipino's tropic clime
Where everything entrances,
The monkey and the tarsier
Free wheel among the branches

In Panamanian wilds as well
The spider and the owl
Are monkeys full of parasites,
Ye Gods, just hear them howl.

The author points out things which we have to guard against in the future. For example, the International Highway is in the way of approaching completion and already we are in close touch with many tropical countries, so that motorists who stay there even a comparatively short time will be just about ready to exhibit symptoms of their catch when they reach home. Endemic areas will be established in certain localities in this country where intermediate hosts are indigenous. Even now the protozoölogist does not have to travel far to find an abundance of material, and apparently there will soon be a super-abundance. The author says plaintively:

"How did the protos become so prominent?
Mass reproduction rendered them dominant.

Why do the protozoölogists weep?
The're too many protos and too little sleep."

The book grew out of the Messenger Lectures, given before a general audience at Cornell University in 1937. There are three appendices, one General Remarks about Protozoa, one a Glossary—much needed by the average reader—and one Bibliography. A good index ends the scene.

The printing and make-up are excellent and the book can be recommended both for the information it contains and the delightful style in which it is written. Before this time one could hardly have imagined that such a difficult subject could be made so entertaining.

MAZŸCK P. RAVENEL

Virus Diseases and Viruses—*By Sir Patrick P. Laidlaw. New York: Macmillan,* 1939. 51 pp. Price, $.90.

This is an attractive and thoroughly satisfactory review of information concerning the filterable viruses. Conspicuously noteworthy is the discussion of the nature of these disease producing agents. While the various opinions currently expressed can scarcely be considered as having reached the stage of controversy they do remind one of the time when Bastian was opposing Tyndall, in England; especially do they recall the conciliatory remark of a British clergyman who, in seeking to pour oil on the troubled waters, said "It is now generally agreed that there is no such thing as spontaneous generation—excepting possibly with regard to the infinitely small." We have come dangerously near the conclusion that this statement should be made all over again. Therefore the section of this lecture which deals with the author's own theory is particularly timely.

So thoroughly interesting and so basically sound is this lecture that everyone concerned with disease should take the opportunity to read it carefully.

A. P. HITCHENS

The New Baby—*By Evelyn S. Bell and Elizabeth Faragoh. Philadelphia: Lippincott,* 1938. 64 pp. Price, $1.00.

Photography with the help of simple captions tells the story of the arrival of the new baby and its place in the family. The book is designed to appeal to children who sooner or later raise questions as to the origin of the new baby. The pictures are exceedingly well posed, in fact they appear as "candid shots," and occupy full pages opposite appropriate statements which carry the story from page to page. The book should prove valuable to parents and teachers as a medium to place in the hands of preschool children.

RICHARD A. BOLT

The Detroit Industrial Worker and His Health—*Detroit, Mich.: Detroit Department of Health, Bureau of Industrial Hygiene,* January, 1939. 30 pp.

Detroit's Health Department in this "photo off-set" brochure of 30 unnumbered pages makes a bid for community interest in industrial hygiene. A credo of 8 facets defines the wants of the industrial worker with respect to his health. In flowing style, easy for the "man on the street" to read and understand, the necessities for adequate industrial hygienic measures for the workers of Detroit are simply portrayed. The text is not unlike present-day popular magazine writing in the field of the medical sciences.

Outstanding difficulties and hazards confronting the workingman are described. Not too greatly burdened with statistics, with here and there an interesting line drawing and spot map, this publication presents a record of accomplishment and indicates the needs for the extension of future industrial hygiene activities in Detroit.

The introduction is an allegory in prospecting for "industrial health gold" in this manufacturing city. Short chapters on Detroit's factories and work places, Detroit's industrial workers, and high points in the bureau's activities for the year 1938 tell the general story. A chapter is devoted to silicosis, and a section under the title "One Achievement" relates the accomplishments of the automobile industry in

controlling lead poisoning. Basic terms in industrial health are defined, and, finally, the industrial health needs for Detroit's workers are outlined.

The report states "Detroit, already known to the world as a great industrial city, needs to be known as a city where the health of its industrial workers is adequately protected." This brochure is an excellent presentation and interpretation of the Bureau's work and plans.

BERNARD S. COLEMAN

Our Common Ailment: Constipation, Its Cause and Cure—*By Harold Aaron, M.D. New York: Dodge Publishing Co.,* 1939. 192 pp. Price, $1.50.

This is a very readable little book and contains a great deal of information on an ailment that some people may suffer from and a great many more think they suffer from. It is intended for the two classes just mentioned but can be profitably read by those who have no such ailment. It is written in non-technical language for the lay reader, but the information presented is based on the newer and scientifically tested knowledge of today. It deals with some of the worn out notions about the processes of digestion and the excretion of waste products. The author classifies and treats of constipation under three types; colonic, rectal, and spastic.

It tells about the false ideas great numbers of people have about the benefits of laxatives, colonic irrigations, and alkalinizations. It suggests the tremendous waste of money spent for these purposes and teaches that only in special cases should these measures be resorted to and only when recommended by a physician.

It classifies the many cathartics and laxatives in common use and points out that even when the use of such is indicated, some very cheap preparation may be just as effective as the high priced article bearing a catchy name.

JAMES WALLACE

Medical Entomology, *With special reference to the health and well-being of man and animals—By William B. Herms. (3rd ed.) New York: Macmillan,* 1939. 582 pp. Price, $5.00.

Though under a somewhat different title, this is the third edition of *Medical and Veterinary Entomology,* published first in November, 1915. This edition has been completely revised and reset and in almost every way has been brought up to date. Emphasis is placed on the rôle of insects and arachnids in public health and human welfare. All of the major groups of the arthropod vectors of disease are considered with their life history and recommendations made for their control. There is sufficient discussion on general parasitology and insect morphology to enable the reader to understand the part which arthropods play in the transmission of disease.

The last chapter in the book discusses the utilization of arthropods in medical practice. We find mention of some ideas which have been discarded, such as the use of cockroaches, crickets, and grasshoppers, one variety of which is said to have been a very good antidote against the poison of the scorpion. Of late years, owing largely to the influence of Baer, of Johns Hopkins, the employment of maggots in the treatment of wounds and indolent ulcers has gained a certain amount of popularity and the author gives directions for producing sterile maggots. Of greatest practical interest, however, is the use of the malarial parasite in general paresis, introduced in 1917 by Wagner-Jauregg. We could wish that this whole chapter were somewhat longer and went into more detail concerning the special laboratories in which mosquitoes are reared and in-

fected, then shipped considerable distances.

The author does not mention the fact that the *Anopheles gambiae* has reached the shores of South America, brought over probably from West Africa by an airplane or fast French destroyer. This is one of the most dangerous of all the malaria-bearing mosquitoes, and its presence in South America, especially in these days of the airplane, menaces the United States. It was recognized on this side of the Atlantic in 1930, and by 1931 had traveled up the coast from Natal 115 miles. In 1938 it was the cause of more than 50,000 cases of malaria in the Jaguaribe Valley. In the affected areas it is estimated that in 1939 nearly every person will be on government relief as a result of its ravages.

A few inaccuracies have been observed. Proper credit is given to Josiah Clark Nott as having been the first (in 1848) to advance a well formulated idea concerning the carriage of both malaria and yellow fever by mosquitoes, but he is credited to New Orleans. He was a native of Columbia, South Carolina, and a resident of Mobile, Alabama.

The printing and make-up are excellent. The illustrations are good, many of them especially so. It is dedicated to the late Dr. G. H. F. Nuttall, a native of California and the frontispiece is an excellent likeness of him. The book is a valuable reference text for practising physicians as well as teachers and students of medical entomology, and should be found in every medical library.

LEONARD D. HASEMAN

Veterinary Helminthology and Entomology—*By H. O. Mönnig (2nd ed). Baltimore: Wood,* 1938. 409 pp. Price, $9.00.

The second edition, after 4 years, of this attractive textbook and reference work will be welcomed by persons concerned with the health of man and of animals. The diction is clear and attractive in style. All sections are thoroughly systematized and there is a fine index. The bibliography is sufficiently extensive to indicate the main sources of information.

The first section deals with the general matters of parasitism, pathogenesis, pathogenic effects, resistance and immunity, general distribution and history; the second covers technic; this includes the collection and preservation of helminths and of arthropod parasites and the making of permanent preparations. There is a very practical section on clinical diagnostic methods in which the technical procedures in most common use are so described that they can be readily followed by laboratory technicians. There are short sections on blood examination for larvae and the technic for eliciting and studying allergic reactions. The section on helminth parasites gives adequate descriptions of the various parasitic worms; their arrangement and characterization are in accordance with the rules of the International Commission on Zoölogical Nomenclature.

The arthropod parasites are discussed after the same manner as are the helminths.

A useful appendix lists the parasites mentioned which infest man, equines, sheep, cows, cattle, pigs, dogs, cats, various wild animals, rodents, and birds.

The book is well printed on excellent paper and attractively bound. It can be thoroughly recommended as a working manual. A. P. HITCHENS

Proceedings, Occupational Disease Symposium—*Chicago: Northwestern University Medical School, Department of Industrial Medicine,* 1939. Paper covers, typewriter planograph, 99 pp. Price, $3.00.

The report of this second annual

symposium, held September 26 and 27, 1938, comprises 8 papers followed by extensive discussions. In addition there are included 2 papers given at the Annual Dinner of the Department of Industrial Medicine, held November 15, 1938.

This second symposium contrasts with the first one held the year previous which was devoted chiefly to specific diseases among workers.

There is such a wealth of material embodied in the present symposium-report as to constitute a veritable text-book in itself. Unfortunately space does not permit even a brief synopsis. All of the authors and discussants are outstanding authorities in their various fields.

One feature, omitted from various conferences in this field, is upon formal industrial medical education, presented in detail by Dr. Peterson. He bases his paper chiefly upon inquiries made of medical and postgraduate schools and special societies, and shows serious oversight in this direction. Dr. Seeger of Milwaukee also stresses this as well as others of the discussants.

The reviewer feels that this symposium, like most of those in this field in recent years, fails to include the labor viewpoint as might be presented, for instance, by a physician actively connected with one of the labor unions, some of which are seriously promoting educational, recreational, clinical, and health projects. No doubt also a report from an officer of a sick benefit association would be interesting. There is also the point of view of the small business man and of the small plant, likewise that of the family practitioner in the mining, industrial, or agricultural labor area. The background effect of the economic status of workers upon their industrial health might be presented by a welfare or social case worker. Finally there is the desirability of a report by an intelligent but impoverished worker who is confronted with the cost of family health maintenance and medical care in the face of a low average annual wage, such as $975 as recently reported by the Social Security Board for the fairly good year of 1937, for over 30 million workers. The question is, Who really represents the worker in our numerous industrial health conferences, as valuable as they are as educational and inspirational forums?

The monograph contains several valuable tables, charts, summaries, and bibliographies, while the work has been carefully edited and the large type makes easy reading. An index would considerably enhance its utility.

EMERY R. HAYHURST

The School Health Program—*By C.-E. A. Winslow. New York: McGraw-Hill,* 1938. 120 pp. Price, $1.50.

An Inquiry into the character and cost of public education in the State of New York was undertaken late in 1935 in order to find out what the educational system of the state is accomplishing, how well its total program fits present-day needs, and what the costs of that program are and should be, with the purpose of reformulating the fundamental educational policies of the state. The Inquiry was divided into 3 major undertakings: (1) the examination of the educational enterprise in the state and the analysis of its outcomes, methods, and costs; (2) the critical appraisal of the work now under way; and (3) the formulation of policies and programs for dealing with the immediate problems and issues, and the long-range objectives of the educational system of the state. The purpose of the inquiry

> . . . has not been to gather great masses of statistics, to devise numerous questionnaires, or to present meticulous factual descriptions of

every phase of education within the state. Rather, the Regents' Committee and the staff of the Inquiry have been interested in isolating major issues and in hammering away at the problems which presented themselves in order to find a reasonably comprehensive solution which would commend itself to the forward-minded people of the State of New York.

Among the studies separately published is a review of the health program of the schools by Professor C.-E. A. Winslow, assisted by Charles C. Wilson, M.D., Director of Physical Education, Hartford, Conn., and Martha W. MacDonald, M.D., of the Michael Reese Hospital, Chicago, Ill. Among those participating in the Inquiry were Don W. Gudakunst, M.D., of Michigan; Clara Bassett, Consultant in Psychiatric Social Work of the National Committee for Mental Hygiene, and Anne Whitney, Director of the School Health Education Service, Washington, D. C. The entire Inquiry was under the direction of Professor Luther Gulick of New York.

This report breaks down the school health program into sanitation in the schools, mental hygiene, health instruction, physical education and recreation, and health services. The report contains an excellent statement of the objectives of the health program broadly conceived, placing emphasis not only on a healthful physical environment but on a healthful intellectual and emotional environment interfused with sound and vital health instruction, a well planned program of physical education and recreation, and a health service program which includes a comprehensive health examination three times during the child's school life.

It is proposed that the health examination of the school child should be made wherever possible by the family physician and that it should be regarded as an educational procedure. The report recommends that the correction of defects should be primarily a family responsibility, and that the chief function of the school nurse should be to arouse the sense of such responsibility. Where public clinic service is necessary it should preferably be provided by the health department or other community agencies rather than through the educational system. The board of education must, however, recognize the responsibility of providing necessary treatment where serious efforts to obtain it in other ways prove unavailing. The various elements of the school hygiene program should not be regarded as separate entities. They can be truly effective only when so integrated in a coördinated whole as to contribute to the sum of all experiences which favorably influence habits, attitudes, and knowledge relating to individual, community and racial health. For this reason the committee believes that all phases of the program should be under the jurisdiction of the educational authority, although medical and nursing personnel of the health department may often be used as the agent of the board of education in this field with great advantage.

The committee recommends the organization of a bureau of health education in the division of the State Education Department which controls the curriculum. This bureau, under the direction of a chief who is qualified as an experienced school administrator, should include representatives of health instruction, physical education, medicine, nursing, and dentistry. There should be added as well the specialists for the care of the physically handicapped. Two new fields should also be represented, namely, public health engineering and mental hygiene. An engineer to advise with regard to the health aspects of school construction and to carry on an educational campaign in the health aspects of school operation is regarded as essential. Similarly the appointment of a mental

hygienist is essential for the formulation and execution of any sound mental health program. This should be formulated in terms of the infusion of a mental hygiene point of view into the objectives and methods of education, rather than in terms of detecting cases of individual maladjustment. Mental hygiene is described as the essence of any true educational process. The report advises against the continuation in the bureau of health education of specialists in diseases of the eye and ear, and of the heart and lungs, partly because there are no corresponding experts in the local school systems for such specialists to supervise and partly because their employment tends to stress an emphasis on curative problems which lie outside the field of education proper. It is recommended that the entire school health program should be formulated and conducted under the advice of a regularly constituted and continuing council on health education.

This report is both critical and illuminating. It will be of value not only in New York State but in other states where the experience of New York State as analyzed by so able a group of students can prove fruitful.

REGINALD M. ATWATER

BOOKS RECEIVED

FIGHTING FOR LIFE. By S. Josephine Baker. New York: Macmillan, 1939. 264 pp. Price, $2.75.

SWIMMING POOL STANDARDS. By Frederick W. Luehring. New York: Barnes & Noble, 1939. 273 pp. Price, $5.00.

WHEN SOCIAL WORK WAS YOUNG. By Edward T. Devine. New York: Macmillan, 1939. 163 pp. Price, $1.75.

NURSING THROUGH THE YEARS. By Corinne Johnson Kern. New York: Dutton, 1939. 340 pp. Price, $2.50.

THE PATIENT AS A PERSON. By G. Canby Robinson. New York: Commonwealth, 1939. 423 pp. Price, $3.00.

EDUCATING FOR HEALTH. By Frank Ernest Hill. New York: American Association for Adult Education, 1939. 224 pp. Price, $1.25.

BERGEY'S MANUAL OF DETERMINATIVE BACTERIOLOGY. By David H. Bergey, Robert S. Breed, E. G. D. Murray and A. Parker Hitchens. Baltimore: Williams & Wilkins, 1939. 1032 pp. Price, $10.00.

ROBERT KOCH. SA VIE ET SON ŒUVRE. By Docteur Emile LaGrange. Paris: M. Legrand, 1939. 90 pp.

HEALTH OFFICERS' MANUAL. By J. G. GEIGER. Philadelphia: Saunders, 1939. 148 pp. Price, $1.50.

THE HEALTH OF COLLEGE STUDENTS. By Harold S. Diehl and Charles E. Shepard. Washington: American Council on Education, 1939. 169 pp. Price, $1.50.

MEDICAL MICROBIOLOGY. By Kenneth L. Burdon. New York: Macmillan, 1939. 763 pp. Price, $4.50.

HISTORICAL DIRECTORY OF STATE HEALTH DEPARTMENTS IN THE UNITED STATES OF AMERICA. By Robert G. Paterson. Columbus: Ohio Public Health Association, 1939. 68 pp. Price, $1.00.

A SYNOPSIS OF HYGIENE. By Sir W. Wilson Jameson and G. S. Parkinson. 6th ed. London: J. & A. Churchill, 1939. 687 pp. Price, $6.25.

MATRIMONIAL SHOALS. By Royal D. Rood. Detroit: Detroit Law Book Co., 1939. 424 pp. Price, $3.50.

HEALTH FOR 7,500,000 PEOPLE. Annual Report of the Department of Health, City of New York, for 1937 and a Review of Developments from 1934 to 1938. By John L. Rice. New York: Department of Health, 1939. 390 pp.

A SELECTED PUBLIC HEALTH BIBLIOGRAPHY WITH ANNOTATIONS

RAYMOND S. PATTERSON, PH.D.

Interesting Statistic—Mr. Weller's excellent advice to his son Samuel to "bevare of vidders" finds statistical justification in this analysis. Well seasoned widows and divorcees for some reason, not stated, are able to catch men younger than can spinsters.

ANON. Age at Marriage and Remarriage. Stat. Bull. (Metropolitan Life Ins. Co.), 20, 4:4 (Apr.), 1939.

Proof That Prevention Pays—New England cities report downward trend in diphtheria deaths, the Middle Atlantic cities hold first place again, and throughout the rest of the country progress is reported in varying degrees except in the Pacific and Mountain states. Results suggest again that rates decline where health agencies urge prophylaxis.

ANON. Diphtheria Mortality in Large Cities of the United States in 1938. J.A.M.A. 112, 20:2043 (May 20), 1939.

Reassuring Vital Records—In 1938 deaths from typhoid and scarlet fever, diphtheria, polio, meningitis, tuberculosis, malaria, pellagra, nephritis, and diseases of pregnancy and childbirth were the lowest on record. Mortality rates from influenza and pneumonia were down too. Cancer and heart disease were the only major causes of death that were higher. Measles case incidence was up. Infant mortality reached a new low of 48, despite the increased birth rate which was up for the second consecutive year.

ANON. Trend of Morbidity and Mortality During 1938 and Recent Preceding Years. Pub. Health Rep. 54, 18:725 (May), 1939.

Typhoid Fever Deaths Reduced—In the large cities of the United States, the trend of the typhoid fever mortality rate is still downward. Noteworthy gains were made in the North Central group of states and New England, and the Middle Atlantic states continue their excellent record of long standing.

ANON. Typhoid Fever in the Large Cities of the United States in 1938. J.A.M.A. 112, 19:1941 (May 13), 1939.

High Case Fatality Ratios—Two stimulating papers discussing the question of improved mortality experience among the tuberculous as an influence upon the general decline in tuberculosis mortality rates. One presents evidence that modern tuberculosis treatment does cure a large enough proportion of cases to have measurable effect upon rates; the other regretfully doubts the validity of the presented evidence.

BOGEN, E. Life Expectancy in Tuberculosis (and) DROLET, G. J. Case Fatality Rates in Tuberculosis. Am. Rev. Tuberc. 39, 5:587 (May), 1939.

Permanent Diphtheria Immunity—Quantitative Schick tests were done upon children earlier immunized with 3 doses of toxin-antitoxin, 2 doses of plain toxoid, 1 dose of alum-precipitated toxoid, or 3 doses of plain toxoid. The results suggest that more immunity is conferred when the antigen is given in greater number of doses at longer intervals. Three doses of toxoid at monthly intervals seem to give the best results.

BUNDESEN, H. N., *et al.* Diphtheria Immunity in Chicago. J.A.M.A. 112, 19:1919 (May 13), 1939.

Something New for Premies—A description of a sealed air-chamber incubator for premature infants which

removes most of the hazards of immediate contact and prevents air-borne infection while providing optimum atmospheric environment. Morbidity and mortality rates have been substantially lowered by its use.

CHAPPLE, C. C., and KENNEY, A. S. Limitation of Bacterial Contamination of Air by a New Automatic Incubator for Infants. Am. J. Dis. Child. 57, 5:1058 (May), 1939.

Who Gets Dental Care?—As you would expect, members of families in the $5,000 plus income level have five times the dental services that those in the $1,200 minus level enjoy. But this is only one of many important findings you will discover in this survey of the habits of a great many white families.

COLLINS, S. D. Frequency of Dental Services among 9,000 Families, Based on Nation-wide Periodic Canvasses 1928–1931. Pub. Health Rep. 54, 16:629 (Apr. 21), 1939.

Consoling Idea Scotched—Wishful thinking that cancer of exposed areas tends to curtail cancer of the more inaccessible parts finds no confirmation in this analysis of British mortality records. In general, occupations in which there is a relatively high skin and lip cancer rate also show an excess of cancer of other sites.

CONRAD, K. K., and HILL, A. B. Mortality from Cancer of the Skin in Relation to Mortality from Cancer of Other Sites. Am. J. Cancer. 36, 1:83 (May), 1939.

Maternal Care Does Benefit—Improvement in maternal mortality rates applies about equally to urban and rural residents. Although the environment may be better in rural areas, and complications of pregnancy more frequent among city dwellers, the more general availability of prenatal and postnatal care in larger communities compensates for the other factors.

DORN, H. F. Maternal Mortality in Rural and Urban Areas. Pub. Health Rep. 54, 17:684 (Apr. 28), 1939.

Unto the Least of These—Two million children are born each year, and 35 million more are still in the process of growing up. Here, indeed, is a social medical problem which is inevitably permanent. We have been slow to accept public responsibility in this regard, but we are showing signs of improvement.

ELIOT, M. M. Public Responsibility for Safeguarding the Health of Children. Am. J. Dis. Child. 57, 4:916 (Apr.), 1939.

Whooping Cough Prophylaxis—In a series of 4,212 children, 1,815 were immunized with pertussis vaccine and all were watched for 44 months: during this time 52 treated children contracted the disease and 348 of the controls also succumbed. Among the known exposed children the infection rate among the immunized was 12.8 per 100, compared with 68.5 in the controls. The attacks were less severe among the immunized children.

KENDRICK, P., *et al.* A Study in Active Immunization Against Pertussis. Am. J. Hyg. 29, 1:133 (May), 1939.

Eloquent Plea for Better Geriatrics—What we do not know about the mental habits, the emotions, and the capabilities of old people is convincingly set forth in this able review which concludes that there is no group of persons whose mental welfare is more neglected than the aged.

LAWTON, G. Mental Hygiene at Senescence. Ment. Hyg. 23, 2:257 (Apr.), 1939.

Colds, Effort, and Exposure—Whatever the causal agent of the common cold may be, it seems capable of precipitating onset most readily when it is present at a time when the normal defenses have been made vulnerable by fatigue-enforced increase in susceptibility to shock. For evidence, see paper.

LOCKE, A. Non-Specific Factors in Resistance. J. Immunol. 36, 5:365 (May), 1939.

Unsuspected Causes of Illness—Subclinical states of nutritive failure are of utmost importance to the hygienist because they are numerous and baffling, and because they impair the patient's sense of well-being. A number of such conditions are described and what was done about them is told.

McLESTER, J. S. Borderline States of Nutritive Failure. J.A.M.A. 112, 21:2110 (May 27), 1939.

Weather Controversy Continued—Prevailing average temperatures and man's combustion rates are related, this author maintains—despite the expressed doubts of others. That the northern half of the Mississippi enjoys more metabolic breakdowns than the southern part is a case in point. Diabetes, goiter, Addison's disease, as well as disturbances of the circulatory function are affected by this phenomenon.

MILLS, C. A. Climate Metabolic Stress. Am. J. Hyg. 29, 3:147 (May), 1939.

Why They Take Pen in Hand—Ten thousand requests for information addressed to the Public Health Service from every corner of the United States are surveyed. One hopeful sign is a shift from disease entities to hygiene, sanitation, and provisions for medical care in the questions asked. Also noteworthy is interest taken in chronic conditions rather than acute communicable diseases, which formerly received the lion's share of attention. Everyone will find this analysis most provocative.

OLESEN, R. What People Ask About Health. Pub. Health Rep. 54, 19:765 (May 12), 1939.

Tuberculosis Prophylaxis—This study indicates that vaccination with heat-killed tubercle bacilli confers some protection to the disease. The place was a Jamaica mental hospital where exposure is likely. About half of those admitted with negative skin tests were given 5 injections of vaccine. The rest were controls. The attack rate was appreciably lower in the treated group.

OPIE, E. L., *et al.* Protective Inoculation against Human Tuberculosis with Heat-Killed Tubercle Bacilli. Am. J. Hyg. 29, 3:155 (May), 1939.

Civilized Tooth Decay—Dental caries is distinctly more prevalent among Eskimos who have picked up white man's habits than among primitive groups who have never enjoyed such blessings. The caries which does occur among the Eskimos is the common or garden variety.

ROSEBURY, T., and WAUGH, L. M. Dental Caries among Eskimos of the Kuskokwim Area of Alaska. Am. J. Dis. Child. 57, 4:871 (Apr.), 1939.

Certain Conclusions from Uncertain Data—Evidence in vital statistics is not of a quality to warrant a definite statement that heart disease or cancer is, or is not, increasing as a public health problem. Discrepancies between recorded rates and reality vary widely in both degree and direction. Proof is given.

ROSS, M. A., and McKINNON, N. E. Heart Disease and Cancer Trends. Canad. Pub. Health J. 30, 4:171 (Apr.), 1939.

About Leading the Horse to Water—Four years after being given contraceptive advice at a Cincinnati clinic, the recipients were interviewed. Four out of 5 seemed to be doing quite well, but more than half had rejected the advice they had received.

STIX, R. K. Birth Control in a Midwestern City. Milbank Quart. 17, 2:152 (Apr.), 1939.

Truth Where It Hurts—Garbage-fed hogs spread trichinosis. It may be saving pennies to feed raw garbage to swine rather than to dispose of it by more sanitary methods, but it is costly in terms of human health—so says this authority.

WRIGHT, W. H. The Whole Truth About Hog Feeding. Munic. San. 10, 5:268 (May), 1939.

ASSOCIATION NEWS

SIXTY-EIGHTH ANNUAL MEETING
Pittsburgh, Pa., October 17–20, 1939
HEADQUARTERS — HOTEL WILLIAM PENN

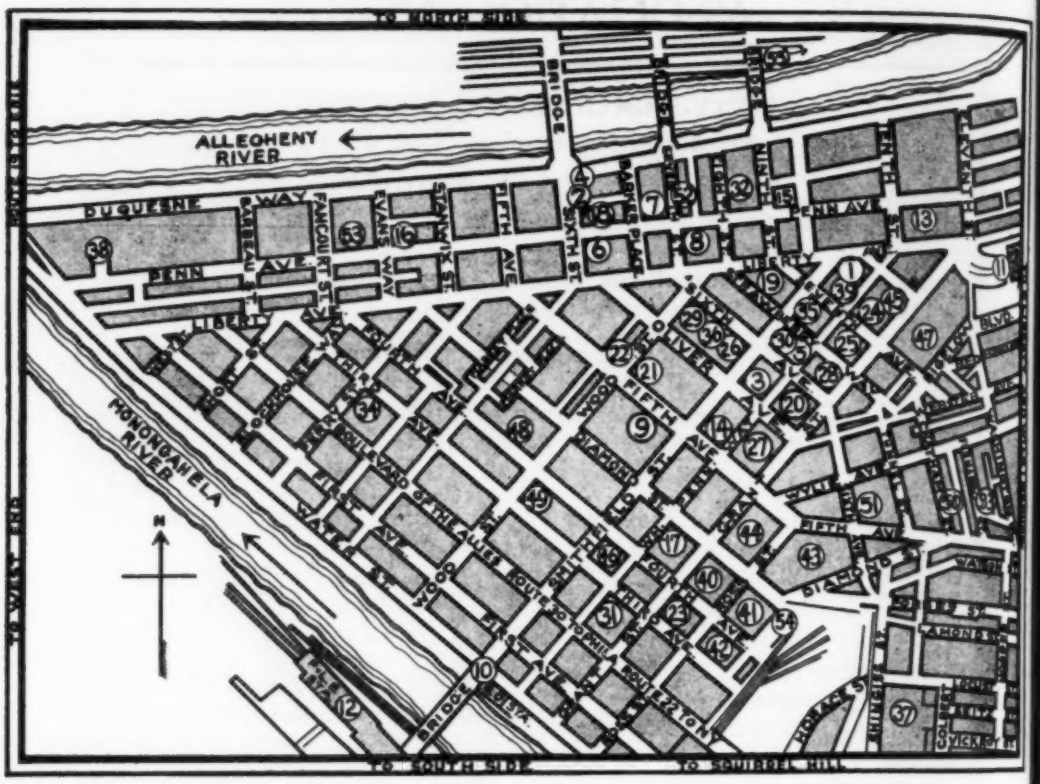
RAILROAD FARES FROM VARIOUS POINTS TO PITTSBURGH, PA.

AMERICAN PUBLIC HEALTH ASSOCIATION
OCTOBER 17–20, 1939

From	*One-way Pullman Travel*	*Round-trip Pullman Travel*	*One-way Lower*	*One-way Upper*
Atlanta, Ga.[2]	$23.75	$42.50	$5.80	$4.40
Baltimore, Md.	9.05	18.10	2.65	2.00
Boston, Mass.	20.10	40.20	4.50	3.40
Buffalo, N. Y.	7.75	15.50	2.65	2.00
Chicago, Ill.	14.10	28.20	3.15	2.40
Cleveland, Ohio	3.95	7.90	2.10	1.60
Dallas, Tex.	38.24	64.50	10.00	7.60
Denver, Colo.	45.16	74.80	10.80	8.20
Detroit, Mich.	8.85	17.70	2.65	2.00
Duluth, Minn.	27.77	48.75	6.30	4.80
Fort Worth, Tex.	38.24	65.80	10.00	7.60
Indianapolis, Ind.	11.15	22.30	3.15	2.40
Jacksonville, Fla.[2]	32.76	57.60	8.40	6.40
Kansas City, Mo.	26.90	48.90	6.30	4.80
Louisville, Ky.	12.80	25.60	3.15	2.40
Los Angeles, Calif.	79.65	118.50	19.70	15.00
Memphis, Tenn.[1]	24.20	43.40	6.30	4.80
Milwaukee, Wis.	16.65	32.05	3.15 [3]	2.40
Minneapolis, Minn.	26.31	46.55	5.80	4.40
Nashville, Tenn.[1]	18.52	33.75	4.50	3.40
New Orleans, La.[2]	34.50	58.30	8.40	6.40
New York, N. Y.	13.15	26.30	3.15	2.40
Omaha, Nebr.	29.01	50.65	6.30	4.80
Philadelphia, Pa.	10.45	20.90	2.65	2.00
Portland, Ore.	78.44	118.50	19.70	15.00
Salt Lake City, Utah	58.89	87.55	13.95	10.60
San Francisco, Calif.	79.65	118.50	19.70	15.00
Seattle, Wash.	78.44	118.50	19.70	15.00
St. Louis, Mo.	18.55	37.10	4.50	3.40
Washington, D. C.	9.05	18.10	2.65	2.00
Montreal, Que.[4]	21.00	42.00	5.55	4.20
Halifax, N. S.[4]	41.95	83.90	9.30	8.00
Ottawa, Ont.[4]	20.00	40.00	5.55	4.20
Quebec, P. Q.[4]	26.65	53.30	5.55 [5]	4.20
Toronto, Ont.[4]	11.50	23.00	2.65 [6]	2.00
Vancouver, B. C.	78.44	118.50	19.70	15.00

1. Via Cincinnati
2. Via Washington
3. Pullman to Chicago only
4. Via Buffalo
5. Pullman to Montreal only
6. Pullman to Buffalo only

THE GOLDEN TRIANGLE
PITTSBURGH, PA.



Courtesy of This Week in Pittsburgh

SHOWN ON THE MAP

THEATERS

1—Senator
2—Alvin
4—Fulton
5—Nixon
6—Penn
7—Barry
8—Stanley
9—Warner
Art Cinema (Liberty & Eighth St.)

RAILROAD STATIONS

10—Baltimore & Ohio
11—Pennsylvania
12—Pgh. & Lake Erie
54—Fourth Ave. Station

HOTELS

13—Fort Pitt
17—Pittsburgher
18—Roosevelt
20—William Penn
Keystone, Wood Street

PRINCIPAL BUILDINGS

21—Farmers Bank
22—First National Bank
23—Grant
24—Gulf
25—Koppers
26—Oliver
27—Union Trust
55—Heinz Plant
Jenkins Arcade (Liberty & Penn)

CHURCHES

28—First Lutheran
29—First Presbyterian
30—German E. P.
31—Salvation Army
32—Second Presbyterian
33—St. Peter's
34—St. Mary's Catholic
35—Smithfield M. E.
36—Trinity

PUBLIC BUILDINGS

37—Duquesne University
38—Block House
39—Chamber of Commerce
40—City-County
41—New County
42—County Morgue
43—County Jail
44—Court House
45—Federal Reserve
46—Old U. S. Post Office
47—New U. S. Post Office
48—Pgh. Stock Exchange
49—Y.M.C.A.
50—Y.W.C.A.

"The Golden Triangle" and the "Point." The junction of the Allegheny and Monongahela Rivers to form the Ohio

PITTSBURGH HOTELS

		Single Room		*Double Room*	
Hotel	*Room Capacity*	*Without Bath*	*With Bath*	*Without Bath*	*With Bath*
William Penn Hotel	1,800		$3.50–$5.00		$5.00–$8.00
Roosevelt Hotel			2.50– 3.00		4.00– 4.50
The Pittsburgher	400		3.00– 4.00		4.50– 6.00
Hotel Schenley			3.50– 4.50		6.00– 8.00
Hotel Fort Pitt		$1.50–$2.00	2.50– 3.50	$3.00	3.50– 6.00
Hotel Webster Hall	600	$2.00	2.50– 3.50		5.00– 7.00
Hotel Keystone			2.50– 3.00		4.00– 7.00

.....(Cut off on this line and mail to the hotel of your choice).....

HOTEL RESERVATION BLANK FOR THE PITTSBURGH MEETING
AMERICAN PUBLIC HEALTH ASSOCIATION
OCTOBER 17–20, 1939

To .....
(Name of Hotel)

Please reserve for me ..... rooms for ..... persons for the A.P.H.A. Meeting.

Single room ..... Double room .....

Maximum rate per day for room $..... Minimum rate per day for room $.....

I expect to arrive ..... If date of arrival is changed I will notify you at least 24 hours in advance.

Please acknowledge this reservation.

Name .....

Street address .....

City ..... State .....

APPLICANTS FOR MEMBERSHIP

The following individuals have applied for membership in the Association. They have requested affiliation with the sections indicated.

Health Officers Section

Evon L. Anderson, M.D., Front Street, Fort Benton, Mont., Chouteau County Health Officer

Irving J. Bridenstine, M.D., Terry, Mont., Prairie County Health Officer

Thomas H. Bruce, M.D., C.P.H., Court St., New Cumberland, W. Va., Hancock County Health Officer

Major Henry F. Buettner, M.D., 5005 Edmondson Ave., Baltimore, Md., Health Officer, City Health Dept.

Hugh E. Dierker, Jr., M.D., 7300 Santa Fe Ave., Los Angeles, Calif., Consultant Communicable Disease Physician, Los Angeles County Health Dept.

Tilman E. Dodd, M.D., C.P.H., Kaufman, Tex., Director, Public Health District 3

William H. Hutto, M.D., 408 Armstrong-Landon Bldg., Kokomo, Ind., Health Officer

Louis Salazar, M.D., Kanakanak, Alaska, Government Physician, Office of Indian Affairs

Raymond A. Steadman, M.D., Health Dept., Wartburg, Tenn., Health Officer, Morgan-Scott District Health Dept.

Kolbein K. Waering, M.D., C.P.H., 2547 St. John's Ave., Jacksonville, Fla., Director, Duval County Health Unit

William R. Warren, M.D., 511 Eaton St., Key West, Fla., City Health Officer

Vital Statistics Section

Percy W. Weston, Division of Vital Statistics, Parliament Buildings, Victoria, B. C., Canada, Assistant Inspector of Vital Statistics

Laboratory Section

Elizabeth Cober, M.S., 1419 Elm Street, Wilkinsburg, Pa., Technician in Bacteriology, Western Pennsylvania Hosp.

Harry P. Gelsing, B.S., 100 Chaucer St., Helena, Mont., Chief Bacteriologist, Hygienic Laboratories, State Board of Health

Philip B. Hadley, Ph.D., Western Pennsylvania Hospital, Pittsburgh, Pa., Chief, Bacteriological Service and Research Bacteriologist, Institute of Pathology

Edward P. Joneschild, D.V.M., Livestock Sanitary Board, Helena, Mont., Deputy State Veterinarian

Anita H. Leavitt, B.S., 422 West Main St., Lansing, Mich., Bacteriologist, American Public Health Assn.

Gregory Pincus, D.Sc., Biological Laboratories, Clark University, Worcester, Mass.

George W. Shadwick, Jr., B.S., 1526 South State St., Chicago, Ill., Director, Control Laboratory, Beatrice Creamery Company.

Public Health Engineering Section

Leslie Cummins, Route 1, Huntsville, Ala., Sanitation Officer, Madison County Health Dept.

Samuel M. Ellsworth, B.S., 12 Pearl St., Boston, Mass., Consulting Sanitary Engineer

Charles F. Haynes, D.V.M., Lexington Apartments, Helena, Mont., Deputy State Veterinarian, Livestock Sanitary Board

H. George Henderson-Watts, P. O. Box 1514, Kelowna, B. C., Canada, Chief Sanitary Officer, District Health Unit

Otto J. Schmidt, B.S. in C.E., 307 South University, Peoria, Ill., Assistant Sanitary Engineer, State Dept. of Health

William Shea, P. O. Box 332, 305-3 St., N. W., Great Falls, Mont., Sanitary Commissioner, City-County Health Dept.

Benjamin Yuk Wo Wong, B.S. in C.E., Board of Health, Hilo, Hawaii, Sanitary Engineer

Industrial Hygiene Section

Louis W. Spolyar, M.D., State House Annex, Indianapolis, Ind., Chief, Bureau of Industrial Hygiene, State Board of Health

Food and Nutrition Section

Paul A. Downs, Ph.D., 1301 North 38 St., Lincoln, Nebr., Teacher and Research Worker in Dairy Bacteriology, University of Nebraska

Child Hygiene Section

Abraham B. Rosenfield, M.D., Hibbing High School, Hibbing, Minn., School Physician

Lewis A. Scheuer, M.D., 247 Wadsworth Ave., New York, N. Y., Pediatrician, New York Foundling Hospital

Public Health Education Section

Fred F. Fitzgerald, Ph.D., 230 Park Avenue, New York, N. Y., Director of Research, American Can Company

James G. Stubblebine, M.D., Big Timber, Mont., Sweet Grass County Health Officer

Ralph O. Wagner, D.D.S., 2940 Summit St., Oakland, Calif.

Public Health Nursing Section

Ruth Cassidy, R.N., 120 West 5 St., Red Lodge, Mont., School Nurse

Isabelle R. Durie, Weston, W.Va., Lewis County Public Health Nurse

Agnes Fuller, R.N., 303 Ninth Avenue, New York, N. Y., Supervisor, Chelsea Bureau of Nursing, Dept. of Health

Clara H. Gaddie, R.N., C.P.H., Yakutat, Alaska, Field Nurse, Office of Indian Affairs

Ella B. Jones, C.P.H., P. O. Box 1114, Eustis, Fla., Public Health Nurse, Lake County Health Dept.

Anne M. Leffingwell, M.S., B.N., Lane County Health Dept., Eugene, Ore., Supervising Nurse

Helen J. McMillen, State Dept. of Health, Santa Fe., N. M., Regional Consultant, Public Health Nursing

Monica Moore, R.N., Metropolitan Life Insurance Company, Hempstead, L. I., N. Y., Territorial Supervisor

Katherine M. Prusak, Governor Hotel, Olympia, Wash., Field Nurse, Taholah Agency, U. S. Indian Service

Lucille A. Schulte, B.S., 1020 Liberty Bank Bldg., Dallas, Tex., Director, Visiting Nurse Assn.

Mildred E. Simantel, Board of Education, District 2, Billings, Mont., Public School Nurse

Epidemiology Section

Irving R. Abrams, M.D., 6754 Sheridan Road, Chicago, Ill., Assistant Epidemiologist, Board of Health

John E. Elmendorf, Jr., M.D., Rockefeller Foundation, 49 West 49 St., New York, N. Y., Member, Field Staff, International Health Division

Elsie G. Schlosser, M.D., Byram Shore, Port Chester, N. Y., Research Worker, Columbia University

Tennyson B. Sinclair, M.D., Medical Faculty, McGill University, Montreal, Que., Canada, Student

Unaffiliated

Nettie E. Alley, St. Helens, Ore., Columbia County Nurse

Louis Block, Dr.P.H., 435 2nd Ave., New York, N. Y., Health Consultant, New York City Works Progress Administration

Martha O. Elliott, Box 44, Arlington, Calif., Student

Peter J. Galante, M.D., Klamath Agency, Ore., Agency Physician, U. S. Indian Service

William S. Johnson, A.B., Jacksonville Tourist and Convention Bureau, Jacksonville, Fla.

Horace M. Kawamura, 1606 Kilauea Ave., Hilo, Hawaii, Junior Sanitary Inspector, Territorial Board of Health

Shintara Namihira, 8½ Miles, Olaa, Hawaii, Junior Sanitary Inspector, Territorial Board of Health

DECEASED MEMBERS

Maurice Brodie, M.D., Detroit, Mich., Elected Fellow 1934, Elected Member 1932

Leo H. Flynn, M.D., Eau Claire, Wis., Elected Member 1930

Charles H. Mayo, M.D., Mayo Clinic, Rochester, Minn., Elected Member 1928

Walter S. Stanley, San Antonio, Tex., Elected Member 1937

CLOSING DATE FOR ACCEPTING FELLOWSHIP APPLICATIONS

NOTICE is hereby given to any interested members that September is the closing date for accepting Fellowship applications for 1939 election. Eligible members wishing to apply for Fellowship this year should submit their completed applications as much in advance of this date as possible.

AMERICAN PUBLIC HEALTH ASSOCIATION WORLD'S FAIR EXHIBIT

AN additional contributor to the exhibit on Public Health Administration which the Association is sponsoring at the New York World's Fair is Hugh B. Robins, M.D.

EDUCATIONAL QUALIFICATIONS REPORTS

THE Committee on Professional Education of the American Public Health Association has, during the past two years, presented five reports which have been approved by the Governing Council. They deal with the Educational Qualifications of Public Health Statisticians, School Health Educators, Public Health Engineers, Sanitarians and Sub-Professional Field Personnel in Sanitation.

These are available for free distribution in printed form, from the offices of the A.P.H.A., 50 West 50th Street, New York. The first two are issued separately and the other three are printed under one cover.

EMPLOYMENT SERVICE

The Employment Service will register persons qualified in the public health field without charge.

Replies to these advertisements, when keyed, should be addressed to the American Public Health Association, 50 West 50th Street, New York, N. Y., identifying clearly the key number on the envelope.

Position Available

Young woman bacteriologist to supervise industrial laboratory controlling paper manufacture and to conduct a factory hygiene program. Industrial experience desirable. **W419**

Positions Wanted

HEALTH OFFICERS

Physician, M.D., class A medical school; M.S.P.H., University of Michigan, 1939; 10 years' experience in administrative full-time health programs; seeks public health administrative position. **A373**

Physician, aged 39; M.D. and Dr.P.H., Yale University; with excellent training in medicine, pediatrics and epidemiology; now specializing in public health education, will consider appointment in health education or administration. **A366**

Physician, M.D., Syracuse University; postgraduate studies in bacteriology and immunology, will consider position as health officer or epidemiologist. Has served as director of county health unit, director of industrial hygiene and medical statistics, and venereal disease field survey officer. **A305**

Physician, M.D., Yale; M.S. in field of public health, Columbia; also short course for health officers, Vanderbilt; good clinical background, 14 months' public health experience; will consider appointment in child health, epidemiology, or public health administration. **A350**

Experienced physician who has been local health officer and school physician in New York State, now has M.P.H. from Harvard School of Public Health, and wishes position in administration, epidemiology, or public medical service. **A423**

Physician, M.D., Columbia; experienced as county health officer and superintendent of health, seeks position in public health administration or medical executive work. **A396**

Physician, M.D., class A medical school; completed short course for health officers at Vanderbilt; experienced health officer and director of county health unit, will consider appointment as health officer or school physician. **A320**

Well qualified physician, M.D., Rush; M.S.P.H., University of Michigan; with special interests in tuberculosis and venereal disease control, seeks responsible appointment. Excellent references. **A406**

Physician, M.D., class A medical school; 12 years' full-time public health experience; now employed with state department of health; will consider opening with well organized city or state department in communicable disease division or epidemiology or both. Mid-west preferred. **A409**

HEALTH EDUCATION

Well qualified woman in health education wishes position as health coördinator or health counselor. Has wide experience, and Ph.D. from New York University. **H236**

Young woman, M.A., Health Education, Teachers College, Columbia; with splendid international experience, seeks position as director of health education. **H369**

Young woman, Ph.D., Columbia University; splendid background of experience in health education, will consider position as director of public health education. **H294**

Woman, M.D., Boston University; special work Columbia and Massachusetts Institute of Technology; one year's experience in state hospital; interested in psychiatry, desires position in the East in hospital for mental diseases or industrial school. **H247**

Experienced teacher in public health and author; M.A., Columbia; now teaching public health nursing and carrying field promotion, wishes broader opportunity to train field personnel in extending health knowledge and interest to the general public, especially through group education, institutes, exhibits and rural programs. **H400**

LABORATORY

Capable research worker, Ph.D., trained at University of Southern California and Pasteur Institute, seeks position directing laboratory, in research work or field investigation. Has taught bacteriology, directed state hygiene laboratory and hospital laboratories. **L315**

Experienced laboratory director with background of dairy products manufacture and research in control methods; University of Wisconsin, M.S. and Ph.D., desires administrative position with food manufacturing or processing industry, or association with health department doing routine and research work in food control. **L381**

Chemist and bacteriologist, B.Sc.; M.S.P.H. from University of Michigan; experience in field work as chemist; serology training under Dr. Kahn at Ann Arbor, Mich. Three years' experience in public health laboratory work. Will consider position in public health field. **L415**

Young man, M.S.P.H., University of Michigan, knowledge of Medical Bacteriology and Public Health Sanitation, desires position in public or private health organization. **L420**

MISCELLANEOUS

Dentist, graduate of Temple University, with excellent postgraduate experience, desires position in administrative aspects of dental hygiene. **M352**

State Director of Dental Hygiene, graduate, experienced dentist, now serving a state for the third year as director of dental hygiene, will consider change of position. **M421**

Physician, M.D., class A medical school; training in obstetrics and public health. Experienced as director of county health department, teacher of clinical obstetrics and administrator of state maternal and child health program, desires position in public health obstetrics or in maternal and child health administration. **C417**

Engineer with good training and experience in water treatment, sewage plant operation and in research, wishes position as superintendent. Can go anywhere. **E422**

Situations Open

PUBLIC HEALTH PHYSICIAN—Man especially experienced in maternal and infancy work, capable heading department in state board; east. 70-PH, Medical Bureau, Pittsfield Building, Chicago.

SCHOOL PHYSICIAN—Young physician, interested in working with children, with flare for public health; duties will include assisting city health officer, though public health training not required; $2,400, car maintenance allowance; southerner preferred; city of 75,000. 71-PH, Medical Bureau, Pittsfield Building, Chicago.

YOUNG PHYSICIAN—Training in public health work available under auspices state department of health for young man interested in this field; summer course; prospect for health appointment upon completion of course excellent. 73-PH, Medical Bureau, Pittsfield Building, Chicago.

DIRECTOR IN SYPHILOLOGY—Well qualified public health man with experience in large cities required; special training in syphilis work not needed; eastern metropolis. 72-PH, Medical Bureau, Pittsfield Building, Chicago.

STUDENT HEALTH PHYSICIAN—Preferably man interested in graduate work in public health; state university noted for splendid public health course; some teaching. 75-PH, Medical Bureau, Pittsfield Building, Chicago.

SCHOOL NURSE—Graduate nurse eligible to teach hygiene course prescribed by American Red Cross to high school students; minimum bachelor's degree required; some attention to general health problems of school and assisting with physical education; small, live city; central Illinois. 77-PH, Medical Bureau, Pittsfield Bldg., Chicago.

Situations Wanted

PUBLIC HEALTH NURSE—Teacher's certificate from state teachers college; graduate training in public health nursing, University of Minnesota; 6 years, public health nurse; 3 years, chief supervising nurse, division of child hygiene; for further information, please write M. Burneice Larson, Director, Medical Bureau, Pittsfield Building, Chicago.

HEALTH EDUCATOR—A.B., Wellesley; M.S. in public health from state university; 6 years, teaching physiology and science in public schools; 2 years, director of child health education, national organization; 2 years, health counselor and teacher of health education, midwest metropolis; 4 years' social work; for further details, please write M. Burneice Larson, Director, Medical Bureau, Pittsfield Building, Chicago.

BACTERIOLOGIST—Desires position, preferably in public health laboratories; B.A.; eastern school; C.P.H. and Ph.D. (bacteriology), Yale University; has done considerable research; 4 years, bacteriologist and research technician, public health laboratories; for further details, please write M. Burneice Larson, Director, Medical Bureau, Pittsfield Building, Chicago.

PUBLIC HEALTH PHYSICIAN—A.B., midwestern college; M.D., Johns Hopkins; M.S.P.H., University of Michigan; interesting record of successful experience including long term as school physician in fashionable suburb; for further information please write M. Burneice Larson, Director, Medical Bureau, Pittsfield Building, Chicago.

NEWS FROM THE FIELD

WILLIAM HALLOCK PARK RESEARCH FUND

WILLIAM Hallock Park, M.D., of New York, N. Y., who died in April, set aside in his residuary estate a fellowship fund for research in medicine, clinical work and for the study of bacteriology and filterable viruses.

This fund is to continue in perpetuity and is to be known as the "William Hallock Park Research Fund."

ROBERT LIVINGSTON SEAMAN FUND

THE New York Academy of Medicine has announced the establishment of the Robert Livingston Seaman Fund to further research in bacteriology and sanitary science. The Fund has been established through the terms of the will of Dr. Robert Livingston Seaman, and $600 is available for assignment this year.

Applications from institutions or individuals will be received up to September 15.

CHINESE EDITION OF NATIONAL HEALTH SERIES

THE new edition of the National Health Series, published by the National Health Council, of New York, N. Y., has now been translated into Chinese by Drs. K. E. Wu and C. L. Mei, and the entire Series has been published for the Nurses Association of China by the Kwang Hsueh Publishing House, Shanghai.

NEW YORK STATE ASSOCIATION OF PUBLIC HEALTH LABORATORIES

AT the 23rd Annual Meeting of the New York State Association of Public Health Laboratories, the following officers were elected:

President, Gilbert Dalldorf, M.D., Grasslands Hospital Laboratory; Vice-President, Charles M. Carpenter, M.D., Rochester Health Bureau Laboratories; Secretary-Treasurer, Mary B. Kirkbride, Sc.D., State Laboratory, Albany; Members of the Council include Orren D. Chapman, M.D., Bureau of Laboratories, Department of Health, Syracuse, and Arthur W. Wright, M.D., Albany Hospital and Albany Medical College Laboratories.

CANCER RESEARCH AWARD

IT has been announced that the Anna Fuller Memorial Prize for cancer research has been awarded to five English scientists of the Research Institute at the Royal Cancer Hospital, London. This amount of $7,500 will be shared equally by Ernest Laurence Kennaway, director of the institute; James Wilfrid Cook, Colin Leslie Hewett and Izrael Hieger, chemists; and William Valentine Mayneord, physicist.

The award is made upon the recommendation of the president of the American Medical Association, the dean of the Johns Hopkins Medical School, and the dean of the Harvard Medical School.

CHALMERS GOLD MEDAL

THE council of the Royal Society of Tropical Medicine and Hygiene in London has awarded the Chalmers Gold Medal for 1939 to Dr. Max Theiler, of the International Health Division of the Rockefeller Foundation, "in recognition of research of outstanding merit contributing to the knowledge of tropical medicine or tropical hygiene, particularly in reference to yellow fever and the possibility of producing the vaccine by the use of attenuated virus."

The medal was presented at the annual general meeting of the Society at Manson House, London, on June 15.

SOUTH DAKOTA ASSOCIATION CHANGES NAME

THE South Dakota Public Health Association has changed its name to the South Dakota Tuberculosis Association.

CHANGES IN SAVANNAH, GA.

ON November 3, 1938, there occurred the death of Dr. Victor H. Bassett, Health Officer for the City of Savannah and the County of Chatham, as well as that of Dr. Alfred Larson, the Assistant Health Officer. In the interim, Dr. T. H. D. Griffitts, Senior Surgeon, U. S. Public Health Service, and Director of the Henry R. Carter Memorial Laboratory, Savannah, was appointed Acting Health Officer until the appointment of Dr. Clarence D. Hart, who took office on April 7. After only three days' service, Dr. Hart died suddenly on April 10, 1939. Again Dr. Griffitts assumed the position of Acting Health Officer. On May 1, 1939, Dr. Charles C. Hedges, Senior Medical Officer of the Federal Trade Commission, Washington, and the former Health Officer of Isle of Wight, Nansemond and Suffolk Counties, Va., was appointed as Health Officer of Savannah and Chatham County, assuming his duties on May 8. Dr. Glenn J. Bridges has been appointed Assistant to Dr. Hedges.

PERSONALS

Central States

LAWRENCE A. BERG, M.D.,† formerly Director of the Menominee County, Mich., Health Department, has been appointed to take charge of the newly organized health unit of St. Joseph County, with headquarters in Centerville.

CONRAD ARNOLD ELVEHJEM, PH.D.,† Professor of Agricultural Chemistry of the University of Wisconsin, Madison, Wis., was awarded a prize of $1,000 at the closing meeting of the American Institute of Nutrition in Toronto, April 26, for his discovery that nicotinic acid would cure pellagra.

BESS EXTON, C.P.H.,† has been appointed Assistant in Health Education on the staff of the American Association for Health, Physical Education and Recreation. Miss Exton was formerly Executive Secretary of the Genesee County Tuberculosis Association, Flint, Mich.

DR. MARCOS FERNAN-NUNEZ, Professor of Pathology and Bacteriology, of the Marquette University School of Medicine, Milwaukee, Wis., has been appointed Chairman of the Cancer Committee of the State Medical Society of Wisconsin, succeeding WILLIAM D. STOVALL, M.D.*

C. O. SAPPINGTON, M.D., DR.P.H.,* of Chicago, Ill., has been named winner of the W. S. Knudsen Award for the Most Outstanding Contribution to Industrial Medicine during 1938–1939, at the recent convention of the 24th Annual Meeting of the American Association of Industrial Physicians and Surgeons, at Cleveland, Ohio. The award was made on the basis of Dr. Sappington's new book, *Medicolegal Phases of Occupational Diseases*.

Eastern States

S. S. GOLDWATER, M.D.,* Commissioner of Hospitals of New York, N. Y., was awarded an Honorary degree of Doctor of Public Health by New York University at the June commencement.

RUTH E. GROUT,† formerly the Director of Health Education in Cattaraugus County, N. Y., has received the Ph.D. degree from Yale at the June commencement, and has accepted an appointment as Senior

* Fellow A.P.H.A.
† Member A.P.H.A.

Supervisor of Health Education in the Health and Safety Department of the Tennessee Valley Authority, Chattanooga. She has spent the past year at Yale under a fellowship from the American Association of University Women.

ANTHONY M. LOWELL, C.P.H.,† has resigned his position as Research Secretary with the Philadelphia, Pa., Health Council, in order to accept the position of Assistant Statistician in the Research Service of the New York City Tuberculosis and Health Association.

DR. ROBERT C. SELLEW has been appointed Health Officer of Canaan, Conn.

DR. CHARLES K. SKRECZKO, JR., has been appointed Health Officer of Shelton, Conn., to succeed DR. WILLIAM S. RANDALL.

WILSON G. SMILLIE, M.D., DR.P.H.,* Director of Public Health at the Cornell College of Medicine, New York, N. Y., was awarded an honorary degree of Doctor of Science by Colorado College, Colorado Springs, in June.

DR. JOSEPH S. STYGAR has been appointed Health Officer of Derby, Conn., to succeed DR. THOMAS F. PLUNKETT.

RICHARD W. WEISER, M.D., Medical Director of Public Schools in Kenmore, N. Y., has been appointed Executive Secretary of the Cincinnati Social Hygiene Society to succeed CARL A. WILZBACH, M.D.,* who recently became City Health Commissioner.

Southern States

DR. ONEAL L. ATKINSON has been appointed Health Officer of Hampton, Ark.

DR. MILLARD B. BETHEL, of Statesville, N. C., has been appointed Health Officer of Cabarrus County, succeeding DR. JOHN S. ANDERSON, resigned.

DR. OTHO C. BOWMER, of Corsicana, Tex., was recently elected Health Officer of Navarro County.

DR. FRANK B. BOYLE, of Big Springs, Tex., has been appointed Health Officer of Howard County.

GLENN J. BRIDGES, M.D., has been appointed Deputy Health Officer of the City of Savannah and County of Chatham, Ga.

DR. ROLAND A. BROWN, of Macon, Ga., has been appointed Assistant City-County Health Officer of Bibb County, succeeding DR. HERBERT F. LARAMORE, who has accepted a position on the staff of the U. S. Veterans' Hospital in Los Angeles.

DR. ALBERT S. J. CLARKE, formerly of Clarendon, has been transferred as Health Officer in charge of District No. 16, at Ozark, Ark.

DR. LEE E. EDENS has been appointed Health Officer of Austin, Tex., to succeed DR. DURWOOD L. DODD.

J. W. ERWIN, M.D.,† of Blountville, Tenn., has been appointed Health Officer of Sullivan County, to succeed FRED L. MOORE, M.D.,† resigned.

CHARLES C. HEDGES, M.D., of the Federal Trade Commission, Washington, D. C., assumed his duties on May 8 as Health Officer of Savannah, Ga., and the County of Chatham.

DR. WALTER O. MCCAMMON, of Springfield, Ky., has been appointed Health Officer of Washington County, to succeed the late DR. WILLIAM R. THOMPSON.

DR. WILLIAM F. MCCARTHY has been appointed Health Officer of Jackson County, Mo.

FRAY O. PEARSON, M.D., C.P.H.,† of Livingston, Tenn., has been appointed Health Officer of Hamilton County, to succeed DR. JESSE C. ELDRIDGE, of Chattanooga, resigned.

LOWELL J. REED, PH.D.,* Dean of the

* Fellow A.P.H.A.
† Member A.P.H.A.

School of Hygiene and Public Health, Johns Hopkins University, Baltimore, Md., received the degree of Doctor of Science from the University of Maine at the June commencement.

RICHARD C. SHEPARD, M.D.,† of LaFayette, Ga., has resigned as Health Commissioner of Catoosa and Walker Counties, effective April 15, to engage in private practice.

DR. CHARLES M. SMITH, of Dixon, Ky., has resigned as Health Officer of Webster County.

DR. WILLIAM S. TERRY, JR., of Jefferson, Tex., was recently appointed Health Officer of Marion County.

DR. JAMES A. THRASH, of Columbus, Ga., Health Officer of Columbus and Muscogee Counties, has been elected Superintendent of the Muscogee County Tuberculosis Hospital.

ROY J. TURNER, M.D.,† has been appointed Health Officer of Fayetteville, Ark.

GARLAND L. WEIDNER, M.D.,† has been named Assistant Health Officer of Atlanta, Ga.

DR. ROBERT F. YOUNG, of Cartersville, Ga., has been appointed Commissioner of Health of Bartow County.

Western States

DR. JAMES D. COULTER, of Portola, Calif., has been appointed Health Officer of Plumas County.

DR. HARRY A. CRECELIUS, of Plains, Mont., has been appointed Physician and Health Officer of Sanders County.

DR. ENOS G. DENISON, of Sheridan, Wyo., has been appointed a member of the State Board of Health.

DR. JAMES L. FAULKNER, of Red Bluff, Calif., has been appointed Health Officer of Tehama County, succeeding DR. OTHO T. WOOD.

DR. RAY L. DRINKWATER, of Denver, has been appointed to a 6-year term on the Colorado State Board of Health, succeeding DR. CHARLES A. DAVLIN, of Alamosa.

DR. WILLIAM E. FOUNTAIN, of Merced, Calif., has been appointed Health Officer of Merced County, succeeding DR. CLARENCE C. FITZGIBBON.

JACOB M. FURSTMAN, M.D.,* Health Officer of the Monrovia District, has been named administrative head of the Pomona Health District, Calif.

DR. ALBERT B. GRAY has been appointed Health Officer of Dorris, Calif., succeeding DR. PAUL F. DIEFFENBACHER.

DR. HARRY M. GRAYMAN has been appointed Health Officer of Dos Palos, Calif., to succeed DR. EDWIN A. PATTERSON.

CHARLES G. GROVER, D.D.S., of Denver, has been appointed to a 6-year term on the Colorado State Board of Health, succeeding DR. BEN BESHOAR, of Trinidad.

RAYMOND G. HOWE, D.D.S., of Casper, Wyo., has been appointed a member of the State Board of Health.

REUBEN L. KAUFMAN, M.D., C.P.H.,† for many years District Health Officer at Whittier, Calif., under the Los Angeles County Health Department, has been appointed Health Officer of Riverside County, to succeed the late WENDALL A. JONES, M.D.†

MARSHALL C. KEITH, M.D.,† of Casper, Wyo., Secretary of the Wyoming State Medical Society, has been appointed State Health Officer.

JOSEPH A. MYERS, an attorney of Denver, Colo., has been appointed to a 6-year term on the Colorado State Board of Health, succeeding H. C. DOLPH, D.D.S., of Denver. This is the first time an attorney has served as a member of the state board.

DR. DAVID G. SCHMIDT has been appointed Health Officer of Larkspur, Calif., succeeding DR. CORNWALL C. EVERMAN.

* Fellow A.P.H.A.
† Member A.P.H.A.

DR. GERALD E. STARK, of Coquille, Ore., has been appointed Health Officer of Coos County, succeeding CHARLES L. COYLE, M.D.,† of Grants Pass, resigned.

DANIEL P. TRULLINGER, M.D.,† of Oregon City, Ore., has been appointed Health Officer of Clackamas County, succeeding COURTNEY M. SMITH, M.D.,† resigned.

DR. GEORGE F. TURMAN, of Missoula, Mont., was named Chairman of the State Board of Health, succeeding DR. ENOCH M. PORTER, of Great Falls, at the Board's meeting in Helena, April 6.

FOREIGN

WALTER C. EARLE, M.D.,† of Cuernavaca, Morelos, Mexico, has been appointed Director of the Champaign-Urbana Health District, Illinois.

DEATHS

MAURICE BRODIE, M.D.,* of the Department of Laboratories, Providence Hospital, Detroit, Mich., died May 9, at the age of 35 years. He was formerly in charge of infantile paralysis research at the Bureau of Laboratories, New York City Health Department.

CLARENCE D. HART, M.D., C.P.H.,* formerly Director of the District Health Unit of Newberry, Mich., from April, 1935, to April, 1939, died in April, 3 days after reaching Savannah, Ga., where he was to have taken up his duties as Health Officer of the City of Savannah and Chatham County.

CHARLES H. MAYO, M.D.,† of the Mayo Clinic, Rochester, Minn., and for many years Health Officer of Rochester, died May 26.

* Fellow A.P.H.A.
† Member A.P.H.A.

CONFERENCES AND DATES

Air Conditioning Exposition: See International Heating and Ventilating Exposition.

American Association for the Advancement of Science. Summer Meeting, Section on Medical Sciences, held in collaboration with the American Neisserian Medical Society—Milwaukee, Wis., July 19–24. Annual Meeting—Columbus, Ohio, December 27, 1939–January 2, 1940.

American Congress of Physical Therapy. Hotel Pennsylvania, New York, N. Y. September 5–8. (Following Seminar in Physical Therapy for Physicians and Technicians, August 30–September 2.)

American Congress on Obstetrics and Gynecology—sponsored by the American Committee on Maternal Welfare, Inc. Municipal Auditorium, Cleveland, Ohio. September 11–15.

American Dietetic Association—22nd Annual Meeting. Hotel Ambassador, Los Angeles, Calif. August 27–31.

American Public Health Association. 68th Annual Meeting. Hotel William Penn, Pittsburgh, Pa. October 17–20.

American Society of Civil Engineers—Summer: San Francisco, Calif., July 26–29. Fall: New York, N. Y., September 4–9.

American Society of Heating and Ventilating Engineers. Semi-Annual Meeting 1939 (Great Lakes Summer Meeting). Grand Hotel, Mackinac Island, Mich. July 4–6.

American Standards Association. New York, N. Y. November 30–December 1–2.

American Statistical Association—An-

nual Meeting. Philadelphia, Pa. December 27–30.

Association of Dairy, Food and Drug Officials of the United States—43rd Annual Conference. Hartford, Conn. September 26–29.

Biological Photographic Association—9th Annual Convention. Mellon Institute for Industrial Research, Pittsburgh, Pa. September 14–16.

Colorado Public Health Association. Colorado Springs, Colo. October 3–4.

Convention for the Revision of the Pharmacopoeia of the United States. Washington, D. C., May 14, 1940.

Educational Frontiers, Conference on. School of Education Building, Stanford University, Calif. July 7–9.

Florida Public Health Association. Jacksonville, Fla. December.

International Association for Identification. Tulsa, Okla. September 11–14.

International Association of Milk Sanitarians, Inc.—Annual Meeting. New Hotel Mayflower, Jacksonville, Fla. October 25–27.

International Cancer Congress—Third. Haddon Hall Hotel, Atlantic City, N. J. September 11–16.

International Congress of Microbiology—Third. Waldorf-Astoria Hotel New York, N. Y. September 2–9.

International Heating and Ventilating Exposition—Sixth. Under auspices of the American Society of Heating and Ventilating Engineers, and coinciding with its 46th Annual Meeting. Lakeside Hall, Cleveland, Ohio. January 22–26, 1940.

Michigan Public Health Association. Lansing, Mich. November 1–3.

National Association for Nursery Education — Biennial Meeting. New York, N. Y. October 25–28.

National Association of Sanitarians. Oakland, Calif. December.

National County Officers' Association. Ogden, Utah. July 17–19.

National Education Association, and affiliated organizations. San Francisco, Calif. July 2–6.

National Institute for Traffic Safety Training (Second). University of Michigan, Ann Arbor, Mich. August 14–26.

National Pest Control Association—7th Convention. Hotel Pennsylvania, New York, N. Y. October 23–25.

National Recreation Congress — 24th. Boston, Mass. October 9–13.

National Safety Congress and Exposition—28th. Atlantic City, N. J. October 16–20.

National Society for the Prevention of Blindness. Annual Conference. Hotel Astor, New York, N. Y. October 26–28.

National Warm Air Heating and Air Conditioning Association. Cleveland, Ohio. January 22–26, 1940.

Pacific Science Congress—Sixth. Under the auspices of the National Research Council. Oakland, Calif. July 24–August 12.

Pan-Pacific Surgical Association—Third Congress. Honolulu, T.H. September 15–28.

Southern California Public Health Association. Long Beach, Calif. January 24, 1940.

Texas Public Health Association. Galveston, Tex. October 2–4.

West Virginia Public Health Association. Hotel Fairmont, Fairmont, W. Va. November 6–8.

Western Branch, A.P.H.A. Tenth Annual Meeting. Hotel Oakland, Oakland, Calif. July 23–28.

Canada

International Hospital Association. Toronto, Ont. September 19–23.

American College of Hospital Administrators. Toronto, Ont. September 24–25.

American Hospital Association. Toronto, Ont. September 25–29.

FOREIGN

Fifth National Medical Congress of Uruguay. Montevideo, Uruguay. Summer of 1939.

Summer Course of Phthisiology. Under direction of Professor Eugenio Morelli. Carlo Forlanini Institute, Rome, Italy. July 15–October 15.

International Malaria Course for 1939. Under direction of Professor Giuseppe Bastianelli. Ettore Marchiafava Institute of Malariology, Rome, Italy. July 24–September 20.

Fifth International Congress on Life-Saving and First-Aid to the Injured. Zurich, and St. Moritz, Switzerland. July 23–28.

World Federation of Education Associations, Eighth Biennial Congress. Rio de Janeiro, Brazil. August 6–11. (SS. Rotterdam Summer Cruise to South America: from New York, July 5; from New Orleans, July 10; returning to New York August 27.)

International Congress of Public Health and Public Safety. Liege, Belgium. August 12–15.

Third International Neurological Congress. Copenhagen, Denmark. August 21–25.

International Congress on Public Cleansing. Vienna, Austria. August 24–28.

Eighth Pan American Child Congress. San Jose, Costa Rico. August 28–September 4.

International Conference on Sewage Works and Disposal. Glasgow, Scotland. September 12–18.

Intergovernmental Conference of American Countries on Rural Hygiene. Mexico City, Mexico. End of 1939 (postponed from November 10, 1938).

International Management Congress. Stockholm, Sweden. 1941.

Best Sellers in the Book Service for June

Community Health Organization—Ira V. Hiscock	$2.50
Immunity: Principles and Application in Medicine and Public Health—Hans Zinsser, John F. Enders and LeRoy D. Fothergill.	6.50
Health Education by Isotype—Otto Neurath and H. E. Kleinschmidt.	.25
Principles of Health Education. 2nd ed.—C. E. Turner	2.00
Bergey's Manual of Determinative Bacteriology. 5th ed.—David H. Bergey, Robert S. Breed, E. G. D. Murray and A. Parker Hitchens.	10.00
Preventive Medicine and Hygiene. 6th ed.—Milton J. Rosenau	10.00
Appraisal Form for Local Health Work—American Public Health Association	1.60

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